SAWMILLS

5 Different Makes of Mills

From The Catalog Collection
Of
W. W. Hartge

(I)

SAWMILLING

I hope this book will be of some help to anyone restoring a mill or building a model. I have worked around them off and on for 40 years. I have owned a couple and helped others rebuild them.

Due to the high price of lumber and if one has sufficient power to operate a mill it will be a good paying hobby. It is hard work, but I think it is the most satisfying work I have ever done.

In my opinion the most important part of the mill is the blade. In buying a used blade try to get as much information as you can from the seller. The experienced sawyer is familiar with the hand of a saw. For the benefit of the beginner it may be stated that a saw is either right or left hand. As you stand facing the mill with the teeth on the saw toward you, if the log passes on the right hand side it is a right hand blade. If the log passes on the left of the saw it is a left hand saw. If the saw is not too badly rusted, you will find it marked somewhere near the center hole L. H. or R. H. Also, you may find the speed for which it was hammered. This is very important. The saw marked left hand can be changed to right hand by taking it to a saw smith (the man who understands lumber sawing blades). Make sure the saw slips freely on the saw mandrel and the lug pins fit snug, no burrs on the pins or mandrel. Also, the collars must be clean and free of any burrs. If the collars look badly nicked and rust coated, it is best to have them re-machined before trying to saw lumber. Make sure all mandrel bearings are in first class condition. You must have sufficient power to run the saw at the speed it was hammered in the cut.

There are sawmill clinics held around the country. Check with the local country farm agent or the State Forrester. Attending one of these clinics will be worth your time if you are interested in sawmilling.

Cover picture taken from 1939 Ward's Catalogue with permission.

PROPER GAUGE OF SAWS - For portable mills, as a general rule, we recommend 8-gauge or 9-gauge saws. For larger power, where saws are run a high speed, or for cutting valuable hard woods, saws of thinner gauge may be used.

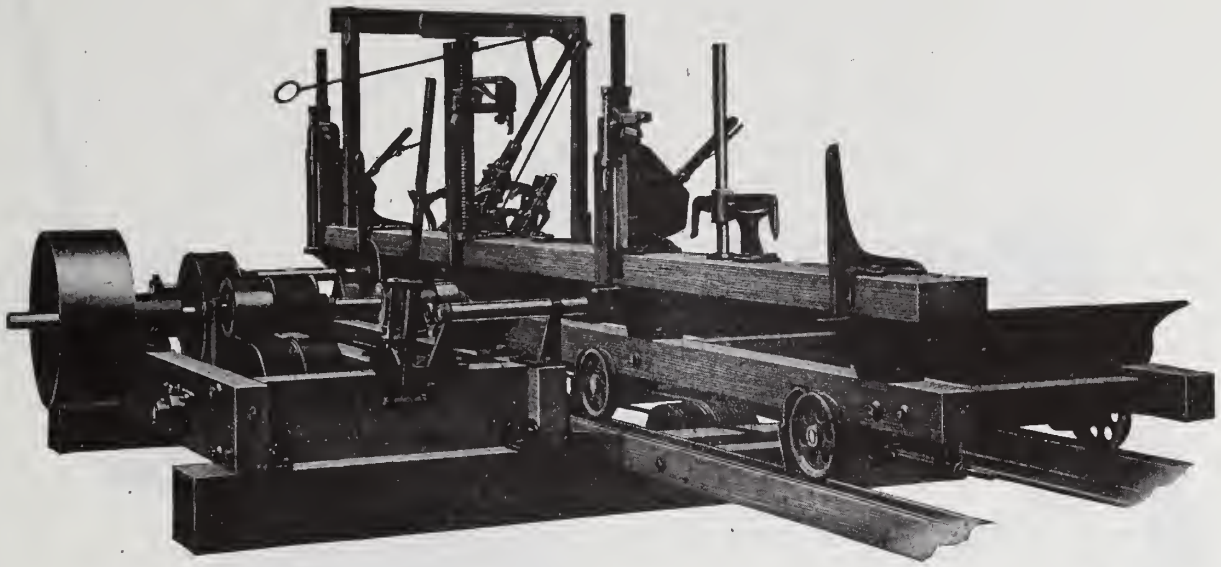
Cause of Trouble with Saws-If a saw is run at a faster or slower speed than that for which it is hammered, it is sure to give trouble. A saw hammered to run a say 500 R.P.M., if run at 350 to 400 R.P.M. in the cut, will be loose in the center and tight around the rim. This will cause it to run "snaking" or crooked in the log and Heat Rapidly in the center and consume a great deal of power.

On the other hand, if a saw that is hammered for slow speed-say 300 to 350 R.P.M. - is run at 500 R.P.M. it will "stretch" too much and be tight in center and loose and "wobbly" on the rim. This will cause it to heat on the rim and "flutter" and run crooked in the log and consume the power. These conditions, and giving the saw Too Much Lead into the log, are the causes of three-fourths of the trouble experienced with mill saws on portable mills.

Spread Wheel - Set the spread wheel flush with the saw and about $\frac{1}{2}$" behind the teeth.

Guides - These should be adjusted clear of the teeth and just touching the plate while the saw is in motion.

Lead- If the saw heats in the center when the mandrel runs cool in the bearing cool it off and give it a little more "lead" into the log.
If the saw heats on the "rim" and not in the center, cool it off and give it a little more "lead" out of the log.
The Track must be perfectly straight and level, so the carriage can run true, and the saw must be in proper line with the carriage.
Adjustment method: First, move the carriage so that one of the headblocks is opposite the cutting side or front of the saw and just back of the shank of the tooth. Pencil mark saw blade where measurement is taken. Then very carefully mark the headblock with a sharp instrument 6" from the saw plate. The carriage may now be moved to the opposite or back edge of the saw, so that the mark on the headblock is just inside the shank of the tooth. Revolve the saw plate so that the mark on the plate is opposite the headblock. The distance from the saw plate to the mark previously placed on the headblock should be 6-1/32" on a 60" saw. This dimension is obtained by adjusting the trunnion screws in the saw mandrel bearing hangers. On a smaller saw this distance should be slightly less. Such a setting will give the saw 1/8" lead in 20 feet. In soft woods, the saw may perform better with more lead.



THE NEW FARQUHAR

ROLLER BEARING SAWMILL No. 9

LOG BEAM

The Farquhar Log Beam Sawmill is designed for sawing long, slender and crooked logs and doing it easily, rapidly and accurately. The Log Beam is firmly supported by Plain Bases extending across the carriage. Set Shaft is supported by the bearing brackets and Set Works. Two pinions on the set shaft mesh with the racks and keep the log beam at exactly the same distance from the saw. The upright knee supports the Set Out and the Last Board Dog.

REGULAR EQUIPMENT—LOG BEAM MILL

Specifications of the Log Beam Sawmill are the same as Headblock Sawmill with the following exceptions:

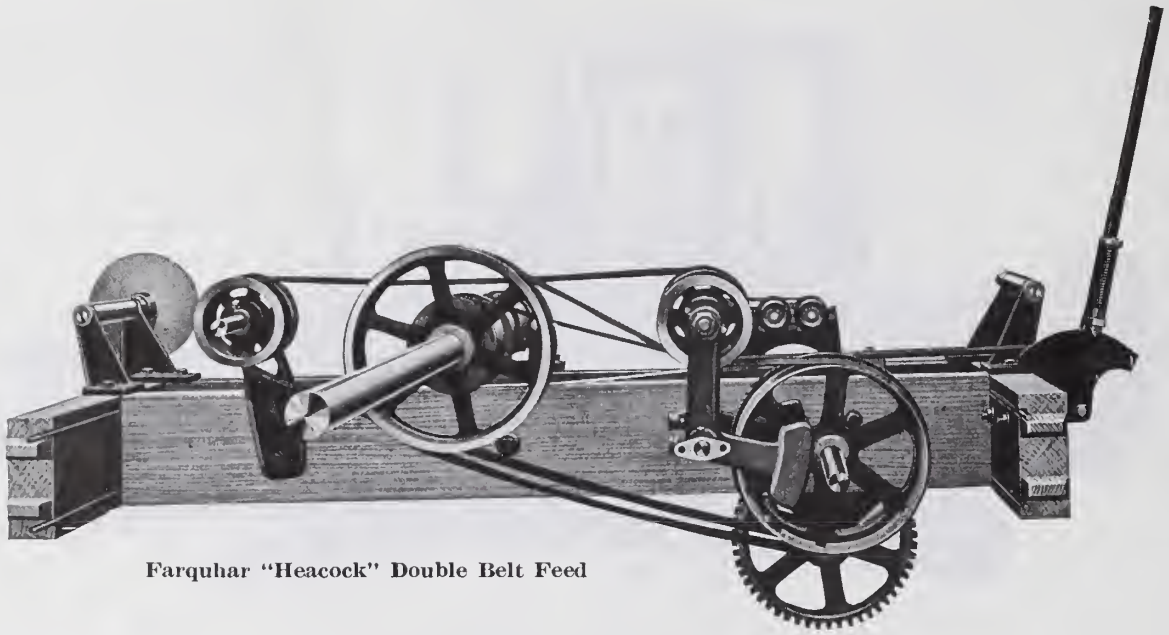
15-foot Log Beam Carriage furnished with Log Beam 3½" x 7½", with two Blank Knees, two Last Board Pistol Grip Dogs, two Set-Outs, one Screw Dog, one Drop Dog and five Headblock Bases.

20-foot Log Beam Carriage furnished with Log Beam 3½" x 7½", with three Blank Knees, two Last Board Pistol Grip Dogs, two Set-Outs, one Screw Dog, one Drop Dog and six Headblock Bases.

25-foot Log Beam Carriage furnished with log beam 3½" x 7½", with four Blank Knees, two Last Board Pistol Grip Dogs, two Set-Outs, one Screw Dog, one Drop Dog and seven Headblock Bases.

EXTRAS FOR LOG BEAM MILL

Friction Power Receder for knees with Automatic Throwout.
Extra Dogs, Belt Tightener, Balance Wheel.
Extra Length to make one-piece 10-foot Mandrel with extra Hyatt Roller Bearing and Standard.
Extra Length Mud Sills and Timber to support 10-foot Mandrel.
Lumber Truck Irons; Log Turner, Sawdust Elevator.
Saw, Main Drive Belt.



Farquhar "Heacock" Double Belt Feed

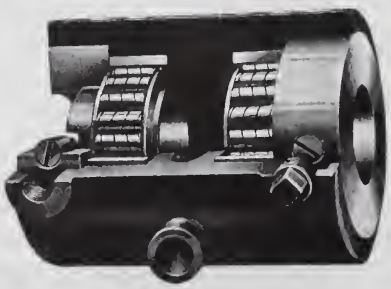
HUSK—The Husk on Farquhar Sawmills is strong and rigid. The deep timbers are carefully mortised and tenoned, bolted together with strong tie-rods and large joint bolts. Four corner brackets are provided for bolting the husk frame to the foundation timbers. The Husk is strongly supported by Mud Sills 6″ x 8″ x 8′ regularly furnished. With this very substantial foundation, the Husk and its equipment gives stability for accurate sawing.

MANDREL—Farquhar Mandrel is made of high grade steel, accurately machined and finished on a heavy grinder assures true and smooth running. Each Mandrel has a heavy, steel saw collar 6 inches in diameter. The holes for saw pins are accurately drilled and provide a means of backing out the saw pins should they by any means break off. Mandrels are of sufficient length beyond the edge of drive pulley for putting on extra pulley with which to drive Sawdust Elevator or other machinery. When desired we furnish extra length to make a 10-foot Mandrel, extra Hyatt Roller Bearing with supporting timber and Mud Sills 6″ x 8″ x 14′.

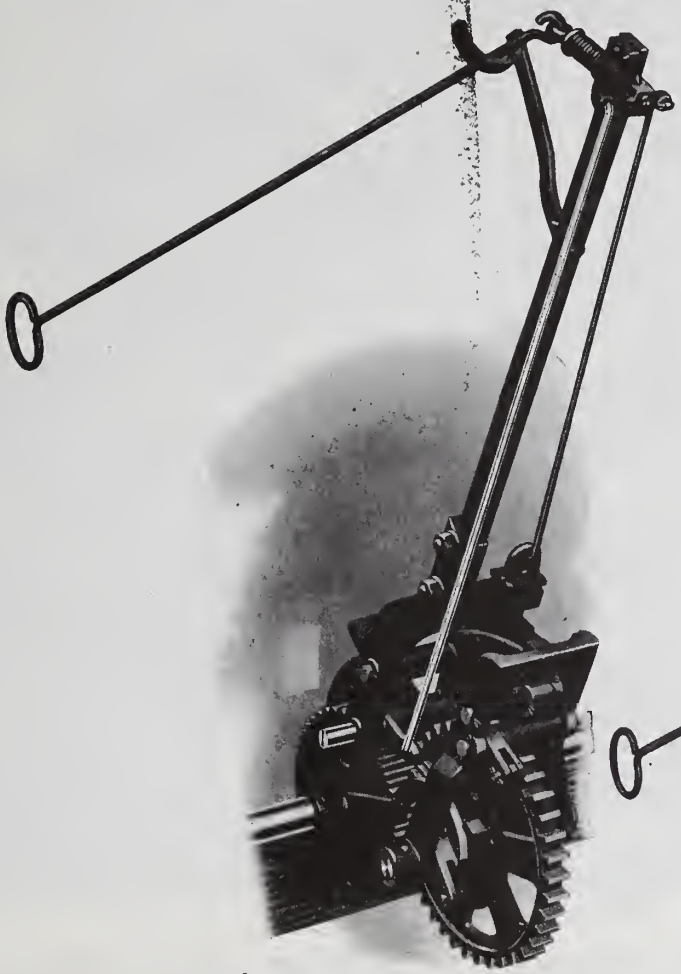
MANDREL PULLEYS—Unless otherwise specified the regular sized Mandrel Pulley is furnished as per table of specifications. Mill can be equipped with proper size pulley to suit the power available.

DOUBLE BELT FEED—In simplicity of design and ease of operation the Farquhar "Heacock" Double Belt Feed has no superior. The well balanced and accurately proportioned pulleys—4″ feed belt, surface speed and ratio of feed gears make the Farquhar feed exceedingly sensitive and responds to the slightest touch of the lever. It has power and speed for quick return of the carriage. Feed per revolution of saw up to 4½″ and gig back up to 10¼″. Spring pressure device holds feed lever in neutral until changed by operator. Moving the lever forward from the interlock, gigs back the carriage while a very slight pull on the lever feeds the log into the saw.

ROLLER BEARINGS—Farquhar No. 9 Roller Bearing Sawmill is equipped with Hyatt Bearings on the Mandrel, Feed Shafts, Feed Idler Pulleys, Drum Shaft and on the Carriage Trucks. This equipment makes it the lightest running sawmill and splendidly adapted for use with light power whether tractor, gas motor, electric motor or steam.



The Dependable Type of Roller Bearings Used on No. 9 Sawmill

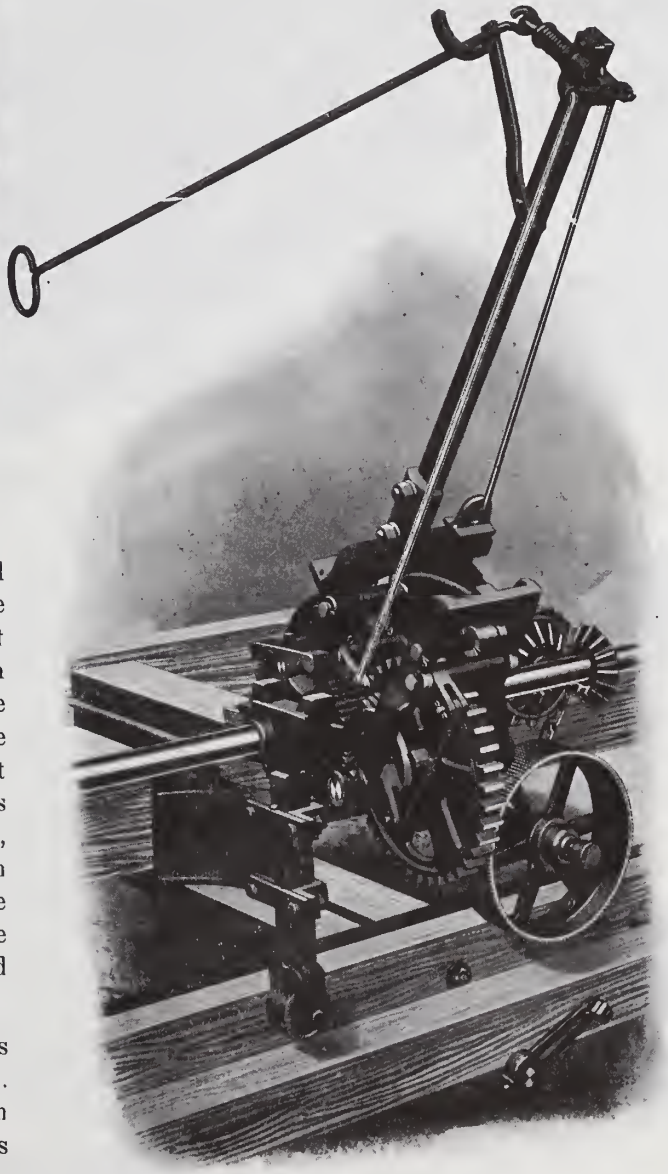


Geared Set Works.

GEARED SET WORKS—Farquhar Geared Set Works is accurate, fast and very easy to operate. All operations are secured through one lever conveniently located. Pawls can be thrown for setting or receding at any position of the lever and regardless of location of set pin in the quadrant, the full receding stroke is maintained. One full stroke of the lever on No. 9 sets the knees toward the saw 1¾ inches and recedes 5 inches.

All Farquhar Sawmills may be equipped with this New Friction Power Receder. The Set Works shown above is so constructed that when equipped with Farquhar New Friction Power Receder it is not necessary to have the Set Works in any certain position to use the friction receder. Pressing the foot on the foot pedal of the friction receder throws the pawls to a neutral point. This friction receder can, therefore, be used for receding the knees upon the return of the carriage regardless of the position of the set works lever. Can also be used for setting the log when mill is equipped with Farquhar Gauge Roller.

SET SHAFT is made in as many lengths as the number of headblocks ordered with a mill. The lengths are coupled together with substantial couplings thus providing means of keeping the knees in perfect alignment.



Geared Set Works with Power Receder and Automatic Throwout.

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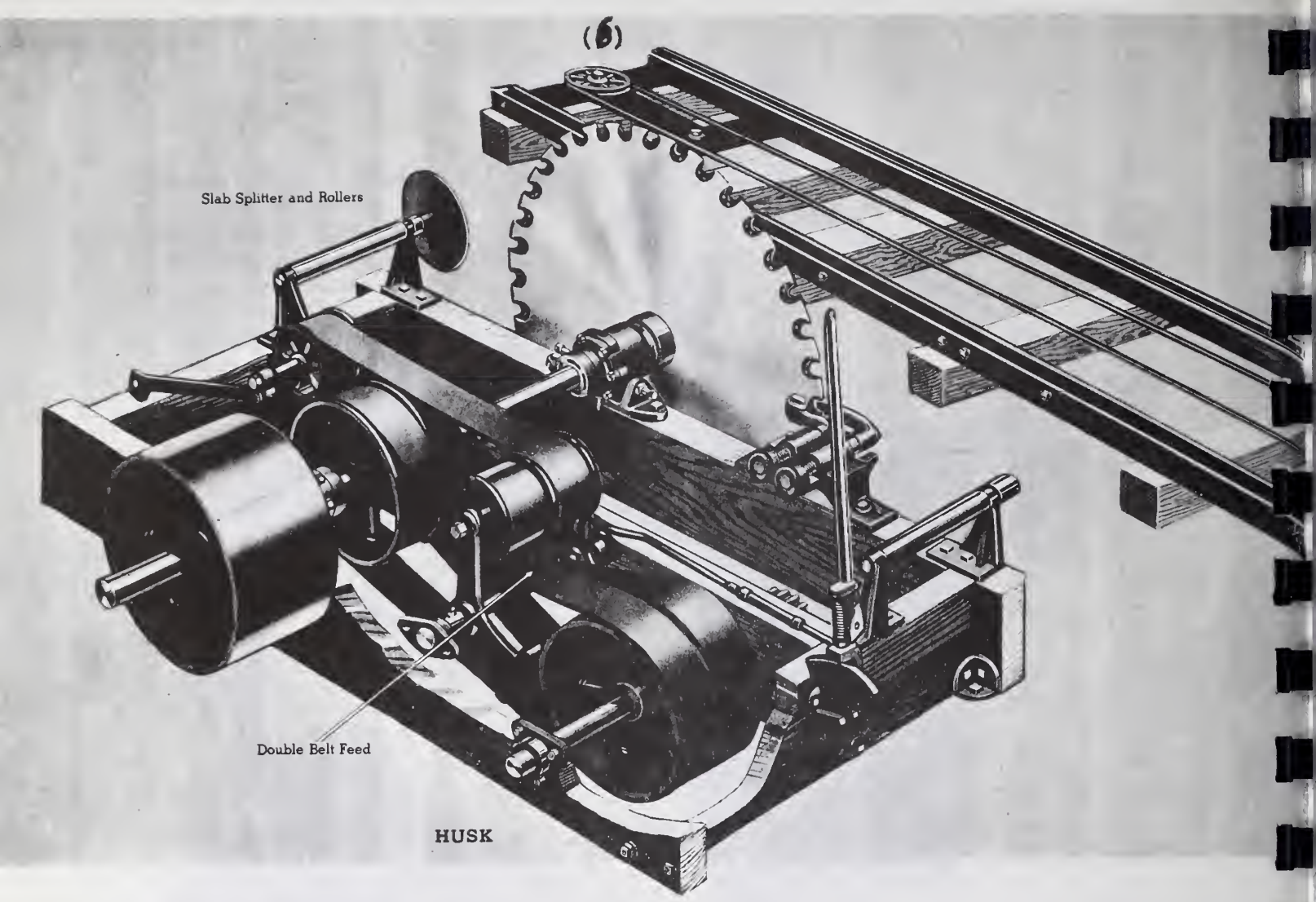
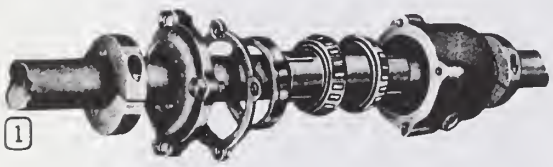


WARD-FARQUHAR SAWMILLS ARE BUILT FOR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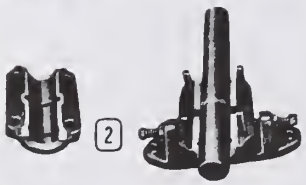
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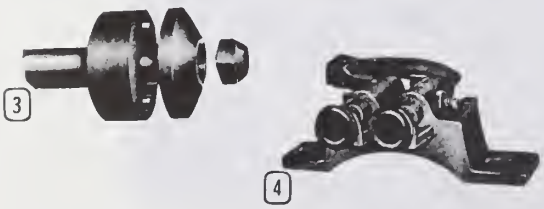
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Built by Farquhar—nationally-known sawmill manufacturer—for continuous, medium to heavy-duty, commercial-type of sawing. These mills have all the speed and capacity . . . the rugged construction . . . and sure-cutting accuracy that has made Farquhar mills outstanding for more than half a century. Three models–each furnished with 15, 20 or 25-foot carriages—enable you to select just the size mill to meet your needs.

So you can determine which mill you want, the various details of their construction are pictured and described on these two pages. The following two pages give specific ordering information on each mill . . . also a complete table of specifications to facilitate comparison.

Sensitive Variable-Speed, Double-Belt Feed—Provides effortless control for the sawyer . . . gives instant, variable speed for feeding log into saw—quick return of carriage. Extra-sensitive at the slightest touch of the control lever because of its accurately-balanced and machined pulleys . . . wide feed belt with fast surface speed . . . and just-right pulley ratio.

Feed-lever quadrant is bolted to front of husk, thus placing sawyer in convenient location for operating both feed and set works. Adjustment for idler pulleys is provided to allow for stretch and shrinkage of belt.

Model-90 feed works is completely equipped with roller bearings . . . Models-120 and 50 have finest high-speed, adjustable babbitted bearings. Portable—easy to move to another "set", because the feed arrangement makes it possible to move the husk assembly as a unit, without removing feed works.

Heavy-Duty, High-Carbon Steel Mandrel—All Ward-Farquhar mills are equipped with special-analysis, high-carbon, ground and polished steel mandrel . . . extra large and heavy for trouble-free operation. Simple, positive setscrew adjustment on bearing-standards permit easy alignment of saw for correct "lead"—allows removal of mandrel, complete with bearings, for transportation without the necessity of re-aligning the saw when mandrel is replaced.

Mandrels on the Models-90 and 50 mills are equipped with self-aligning Timken tapered anti-friction roller bearings (Picture No. 1 at left); cool and free-running, adjustable for end play. Model-120 is fitted with high-speed babbitted bearings (Picture 2 at left)—chain oiling, with large oil wells, for continuous lubrication that insures cool running.

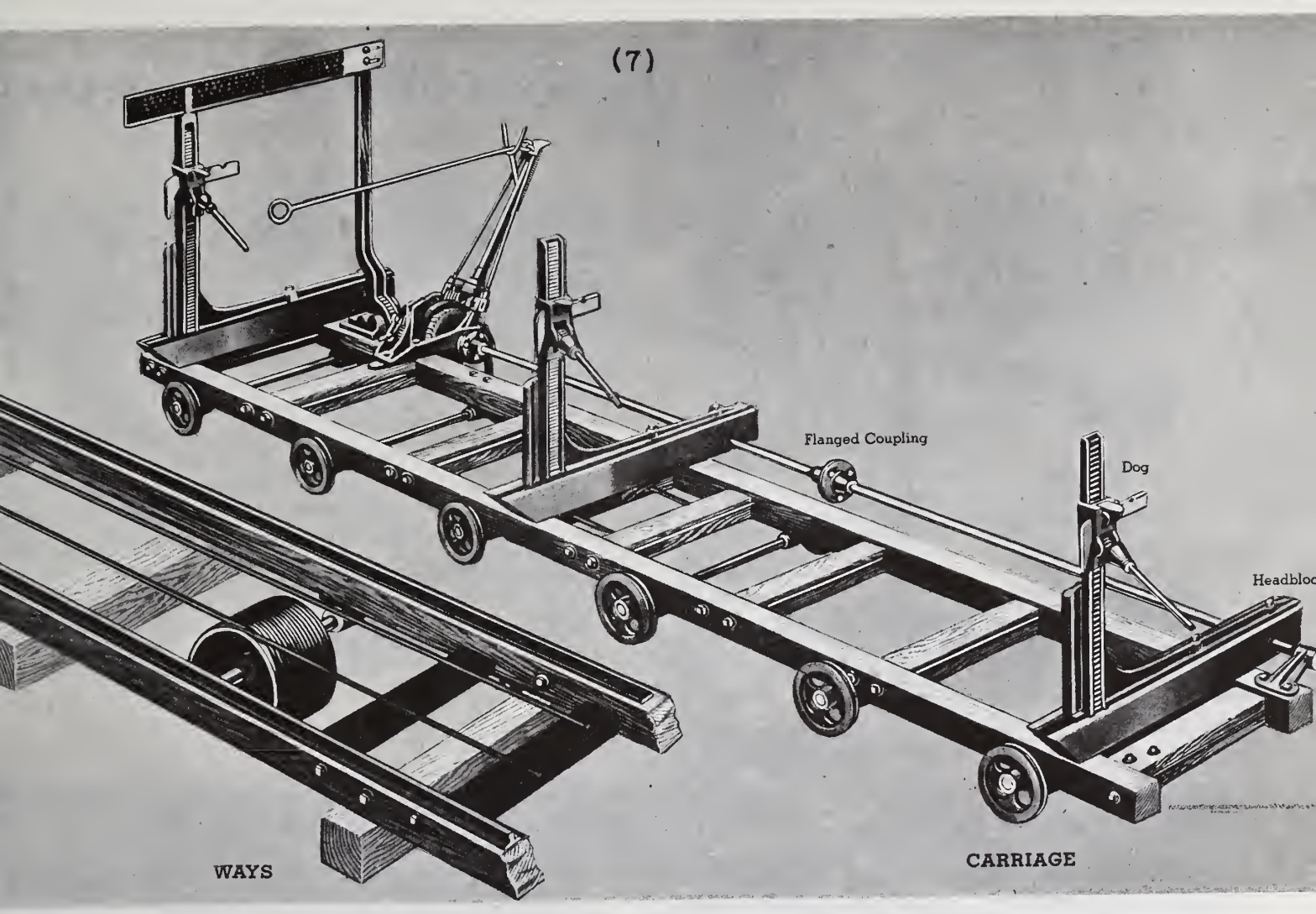
Heavy, 6-Inch Steel Saw Collars—(Picture No. 3). Big, 6-inch diameter, special-analysis, high-carbon steel collars, one tight and one loose, made extra heavy to stand high speed and torsional strains. Tight collar is keyed, shrunk and welded to the mandrel. Both collars are recessed toward the center to grip saw blade tightly at outer edges of collars. Smaller than 6-inch collars will not give sufficient support to the saw, and thinner ones will spring out of true, so big, sturdy collars are a vital necessity for high-speed work and a true-running saw.

Adjustable Saw Guides Prevent Saw "Whip"—Models-90 and 50 are equipped with a double swing-arm type saw guide (Picture 4). Because each arm is independently adjusted, correct alignment and distance between guide pins can be maintained while the saw is running. Outer arm can be thrown back to permit removal of saw without disturbing guide setting. Saw guide on the Model-120 is the solid-arm type, with individual setscrew adjustment on each side, permitting accurate adjustment of guide pins. All models have hardwood guide pins—wedge-shaped on Models-90 and 50; round on the Model-120.

Steel Slab Splitter and Rollers—All models are equipped with a 10-in. revolving-wheel slab splitter, and rollers mounted on strong brackets, which are adjustable to permit proper alignment with saw. (Pictured at top of page on husk.)

Steel Cable Carriage Drive (Picture 5). Insures quick, powerful carriage movement—ideal for all general-purpose work. Rugged all-steel shaft and gears. Cast-iron drum is grooved to prevent slipping and pinching of cable. Steel cable attaches to each end of the carriage—winds on drum, which is keyed to the drive shaft—turns around sheaves, which are mounted horizontally, on each end of the ways. Drive shaft extends under husk and way timbers and is supported at 3 points with Hyatt roller bearings on the Model-90—high quality, long-lived babbitted bearings on Models-120 and 50.

Catalog Illustration courtesy Montgomery Ward & Co.



CONTINUOUS MEDIUM TO HEAVY-DUTY SAWING

Eye-Level Scale Board (Picture 6)—Models-90 and 50 Mills are equipped with an eye-level scale board, up where it is always in full, readable view of the sawyer, who can tell, at a glance, his setting and the number of 1, 1¼, 1½ or 2-in. cuts he has remaining in the log. Model-120 has the widely-used and standard type of scale, which is mounted on the headblock, and graduated into quarter-inch divisions.

Heavy-Duty All-Steel Headblocks—The headblock bases on all Ward-Farquhar models are built up of heavy welded steel; because they're steel, the points can't break off to make last cuts difficult or impossible. Knees are heavily made of best cast iron. Cut-steel racks and pinions (Picture 7) on Models-90 and 50; cast iron on No. 120—insure positive accuracy and easy operation. The rack is doweled and bolted into rigid and permanent alignment to the knee. A safety-stop prevents headblocks from running into the saw. Positive alignment of the headblocks with means for making adjustments, is provided by a flanged coupling on the set-shaft, between each headblock.

Side-Operating Dogs are All Steel (Picture 8)—They're strong, convenient, quick and positive in action. Set from the side, they can be operated with equal convenience by either the sawyer or man on back of carriage. Simple, foolproof construction . . . has but one convenient lever that works with easy up-and-down motion. Carefully made of high-carbon steel throughout. (Pony dogs may be substituted on your order at the same cost, if you prefer.)

Extremely Accurate Set Works (Picture 9)—Made to precision standards from the finest materials, the set works of all Ward-Farquhar mills provide extreme accuracy of setting—give unvarying width of cut, prevent waste. One full stroke of the lever advances the knees toward the saw for cutting a full-size 2-in. board . . . a full reverse stroke recedes the headblocks about 5 in., adding speed to accuracy. Sawyer can regulate advance of headblocks across carriage to allow uniform repeat cuts, simply by placing pin in hole of quadrant that will give the desired thickness setting. This speeds sawing because he doesn't have to watch the scale . . . pin stops advance of headblocks, but the pawls can be thrown for setting or receding at any position of the lever, regardless of where the set-pin is located.

The basic difference between the 12-pawl set-works on Models-90 and 50 and the 8-pawl set-works on Model-120 is in the fineness of set. The 12-pawl set-works permits 1/32-in. (or finer) accuracy of setting for thickness of lumber; the 8-pawl set-works on the 120 provides almost as accurate setting (1/24-in. or finer).

Carriage-Truck Bearings (Picture 10)—Heavy-duty trucks on Model-90 and 50 Mills are equipped with roller bearings and Alemite force-feed lubrication. Carriage-truck bearings on the Model-120 Mill are the reliable, standard split babbitted type. Carriage wheels on all models are made heavy and large for extra strength and easy travel. Wheels on saw side of Model-50 and 90 trucks are machine grooved to run on a "V" track and rear wheels are flanged to bear on flat track. On the Model-120 Mill, which uses 12-lb. steel T-head rail for the ways, the front carriage-wheels are grooved to fit head of rail and the back ones flanged.

WHERE TO FIND IT

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Ward-Farquhar Sawmill and accessories for continuous medium to heavy-duty sawing.
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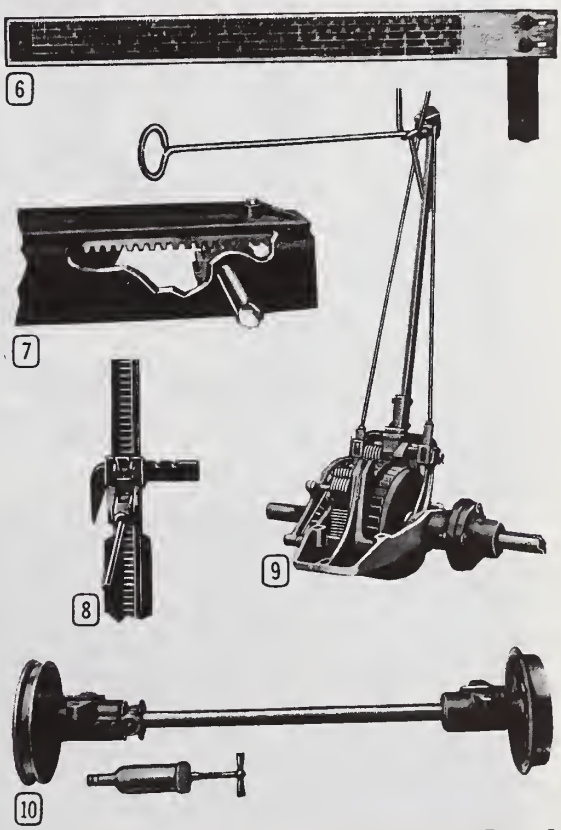
Ward Farm-Type Sawmill and accessories for light to medium duty sawing.
Pages 12-13
Power and transmission requirements—Adaptors, Tachometer, Pulleys, Belting.
Pages 14-15
Solid and inserted-tooth Mill Saws and Cordwood Saws.
Page 16
Disston Chain Saw and Sharpener; Peavies and Cant Hooks, Log Rule.



Catalog illustration courtesy Montgomery Ward & Co.

Model-120 Mill for Light Tractor Power

Meets the demand for Farquhar performance at a lower price. Requires as little as 25 Brake H.P. to operate and may be powered with a light tractor or a car motor. Has sawing capacity of 3000 to 7000 board feet per day. Heavier construction throughout than Wards Farm-Type Sawmill. 8-pawl geared set works provides 1/24-in., or closer, accuracy of setting for thickness of lumber. Heavy saw mandrel is 2 3/16-in. diameter and provided with large chain-oiling babbitted bearings; 6-in. collars. Has 34-in. headblock opening and will swing a 54-in. saw. Regularly equipped with a 20-in. diam. by 8-in. face pulley; 22-in., 24-in. and 26-in. sizes are available at no extra cost. Larger pulleys, 28, 30 or 36-in. diameter by 10-in. face furnished at additional cost. (See Price List.)

Be sure to state size of mandrel pulley you need.

87WS 2500F—15-ft. Carriage with 45-ft. T-Rail Track; 3 Trucks; 2 Headblocks.

87WS 2501F—20-ft. Carriage with 55-ft. T-Rail Track; 4 Trucks; 2 Headblocks.

87WS 2502F—25-ft. Carriage with 65-ft. T-Rail Track; 5 Trucks; 2 Headblocks.

EXTRAS FOR MODEL-120 MILL

87WS 2503F—Swing-Type Belt Tightener and Frame (see description under pict.).

87WS 2504F—Extra Headblock; includes base, knee and side-operating dog, pinion and set-shaft coupling.

87WS2505F—Extra-long 8-ft. Mandrel with chain-oiling bearings and standard, instead of standard mandrel.

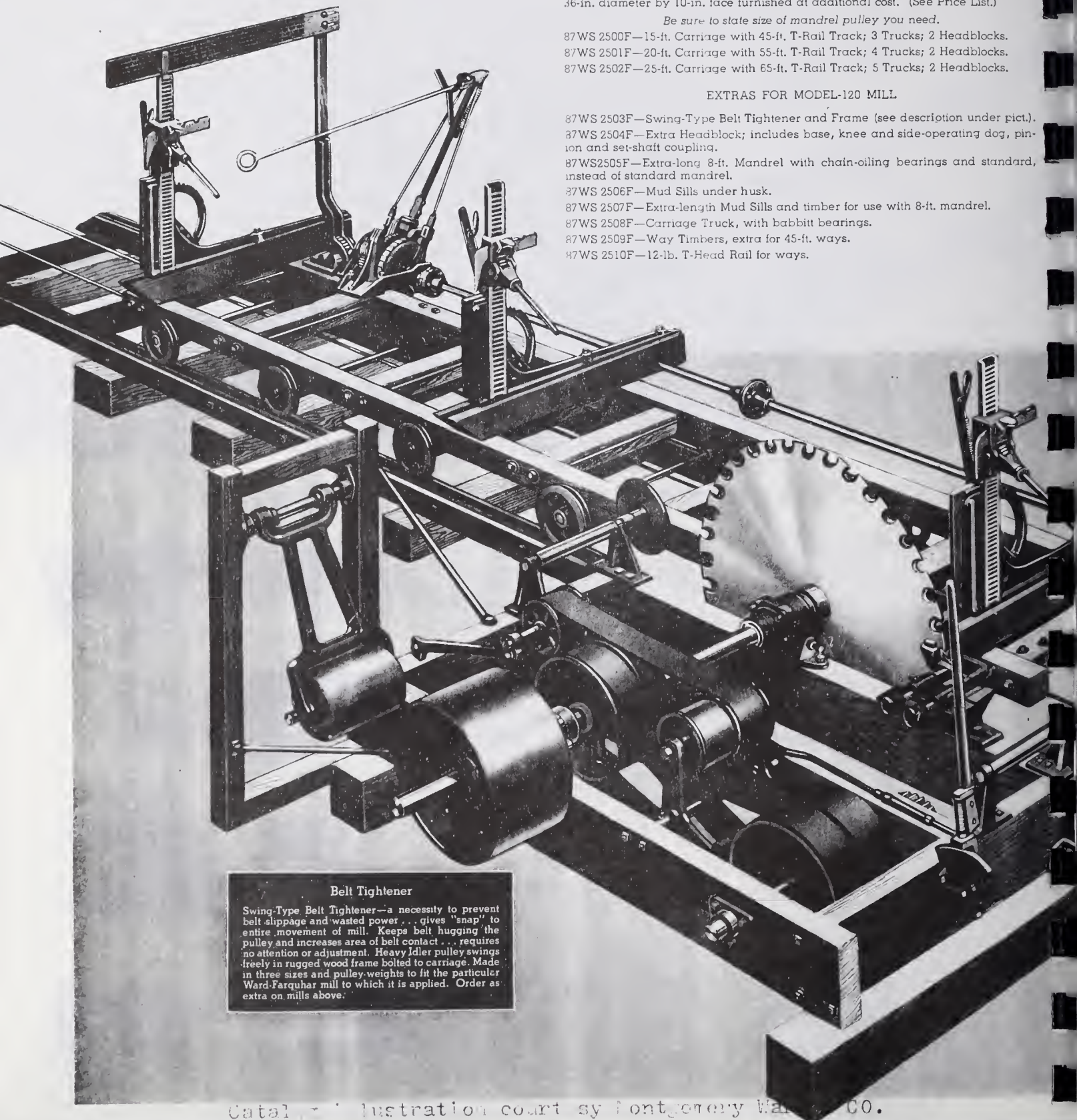
87WS 2506F—Mud Sills under husk.

87WS 2507F—Extra-length Mud Sills and timber for use with 8-ft. mandrel.

87WS 2508F—Carriage Truck, with babbitt bearings.

87WS 2509F—Way Timbers, extra for 45-ft. ways.

87WS 2510F—12-lb. T-Head Rail for ways.



Belt Tightener

Swing-Type Belt Tightener—a necessity to prevent belt slippage and wasted power . . . gives "snap" to entire movement of mill. Keeps belt hugging the pulley and increases area of belt contact . . . requires no attention or adjustment. Heavy Idler pulley swings freely in rugged wood frame bolted to carriage. Made in three sizes and pulley-weights to fit the particular Ward-Farquhar mill to which it is applied. Order as extra on mills above.

Catalog illustration court sy Montgomery Ward & CO.

PORTABLE-TYPE SAWMILLS

Model-90 All Roller-Bearing Mill

Ruggedly built for continuous capacity production. Fitted with roller bearings at every point—on mandrel, feed works and carriage—the light-running Model-90 represents the most popular general-purpose type of mill . . . a mill that probably meets the requirements of more operators than any other model. Has the famous Ward-Farquhar 12-pawl precision set works—gives such extreme accuracy in engaging the teeth that 1/32-in., or finer, setting for thickness of lumber is provided. Will turn out 4000 to 8000 board feet per day. Has 36-in. headblock openings and will swing a 54-in. saw. Should have 35 Brake H.P., or more, for efficient operation. Mandrel is 2 7/16 in. in diameter. Regularly equipped with 22-in. diam. by 10-in. face mandrel pulley; 20, 24 and 26-in. diam. by 10-in. face available at no extra cost. Larger pulleys, 28, 30 and 36-in. diam. by 10-in. face., furnished at extra cost. (See Price List.)

87WS 2515F—With 15-ft. Carriage, 45-ft. Ways, 4 Trucks, 2 Headblocks.

87WS 2516F—With 20-ft. Carriage, 55-ft. Ways, 6 Trucks, 2 Headblocks.

87WS 2517F—With 25-ft. Carriage, 65-ft. Ways, 7 Trucks, 2 Headblocks.

EXTRAS FOR MODEL-90 MILL

87WS 2518F—Belt Tightener and Frame (see description under picture).

87WS 2519F—Extra Head Block. Includes Base, Knee, Side-operating Dog, Pinion and Coupling for set-shaft.

87WS 2520F—Extra-long 10-ft. Mandrel with Timken Roller Bearings and Standard to replace mandrel regularly furnished.

87WS 2521F—Carriage Truck with roller bearings.

87WS 2522F—Mud Sills under husk.

87WS 2523F—Extra-long Mud Sills and timber to support 10-ft. mandrel.

87WS 2524F—Roller Bearing for mandrel, complete with standard.

Model-50 Heavy-Duty Mill

Bigger . . . Heavier . . . Faster, the Model-50 Ward-Farquhar Mill is built to saw big logs at maximum production of 6000 to 12000 board feet per day—day after day—See the difference in the specifications below. Has the finest-quality roller-bearing mandrel and carriage trucks—babbitted bearings on feed works. Has 40-in. headblock opening and will swing a 60-in. saw. Requires 45 Brake H.P., or more, for most efficient operation. Has the Ward-Farquhar 12-pawl geared precision set works—the 12 fingers give such extreme accuracy in engaging the teeth that 1/32-in., or finer, accuracy of setting for thickness of lumber is provided. Regularly equipped with 22-in. diam. by 12 1/2-in. face mandrel pulley; 20, 24 and 26-in. diam. available at no extra cost. Larger pulleys 28, 30 and 36-in. diam., furnished at extra cost. Can be made fully automatic by addition of a power receder without any other extra attachments. (See Price List.)

87WS 2530F—With 15-ft. Carriage, 45-ft. Ways, 4 Trucks, 2 Headblocks.

87WS 2531F—With 20-ft. Carriage, 55-ft. Ways, 6 Trucks, 2 Headblocks.

87WS 2532F—With 25-ft. Carriage, 65-ft. Ways, 7 Trucks, 2 Headblocks.

EXTRAS FOR MODEL-50 MILL

87WS 2533F—Belt Tightener and Frame (see description under picture).

87WS 2534F—Extra Head Blocks. Includes Base, Knee, Side-operating Dog, Pinion and Coupling for set-shaft.

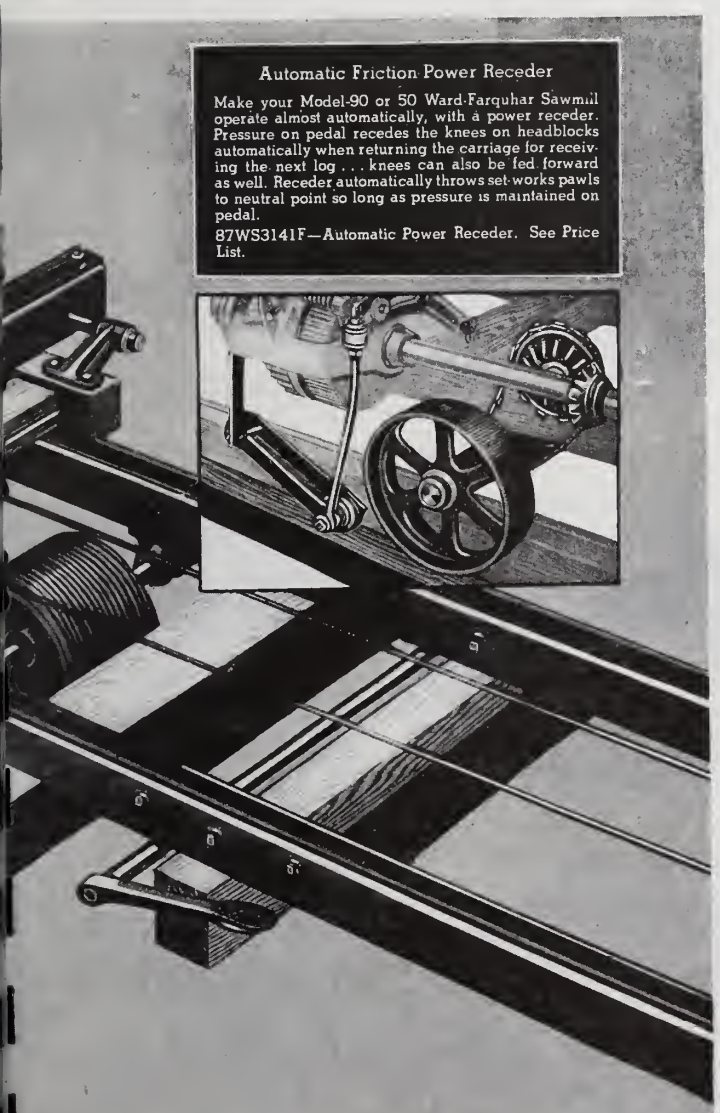
87WS 2535F—Extra-long 10-ft. mandrel with Timken Roller Bearings and standard to replace mandrel regularly furnished.

87WS 2536F—Carriage Truck with roller bearings.

87WS 2537F—Mud Sills under husk.

87WS 2538F—Extra-length Mud Sills and timber to support 10-ft. mandrel bearing standard.

87WS 2539F—Roller Bearing for mandrel, complete with standard.



Automatic Friction Power Receder

Make your Model-90 or 50 Ward-Farquhar Sawmill operate almost automatically, with a power receder. Pressure on pedal recedes the knees on headblocks automatically when returning the carriage for receiving the next log . . . knees can also be fed forward as well. Receder automatically throws set-works pawls to neutral point so long as pressure is maintained on pedal.

87WS3141F—Automatic Power Receder. See Price List.

STANDARD SPECIFICATIONS FOR WARD-FARQUHAR SAWMILLS

HUSK

	Model 120	Model 90	Model 50
Length Overall	6 ft. 3 1/2 in.	6 ft. 10 in.	8 ft. 4 in.
Width Overall	3 ft. 1 in.	3 ft. 6 in.	4 ft. 1 in.
Size of Timbers	3 1/2 x 9 in.	3 1/2 x 9 in.	3 1/2 x 11 1/2 in.
Diameter of Brace Rods	1/2-in.	1/2-in.	5/8-in.
Diameter of Saw Mandrel	2 3/16 in.	2 7/16 in.	2 11/16 in.
Length of Saw Mandrel	4 ft. 6 in.	5 ft. 8 in.	6 ft. 6 in.
Saw Collar, Diameter	6-in. steel	6-in. steel	6-in. steel
Saw Center Hole Diameter	2 in.	2 in.	2 in.
Saw Pin Hole Diameter	5/8 in.	5/8 in.	5/8 in.
Dist. Between Pin Hole Centers	3 in.	3 in.	3 in.
Mandrel Bearings	Babbitt	Timken	Timken
Number on Husk	2	2	2
Feed Work Belts	3 in.	4 in.	5 in.
Feed Per Revolutions of Saw	0 to 4 1/2 in.	0 to 4 1/2 in.	0 to 5 in.
Gigback Per Revolution of Saw	0 to 9 1/2 in.	0 to 9 1/2 in.	0 to 12 in.
Mandrel Pulley (regular)	20 x 8 in.	22 x 10 1/2 in.	22 x 12 1/2 in.
Spreader Wheel	10 in. diam.	10 in. diam.	10 in. diam.

CARRIAGE

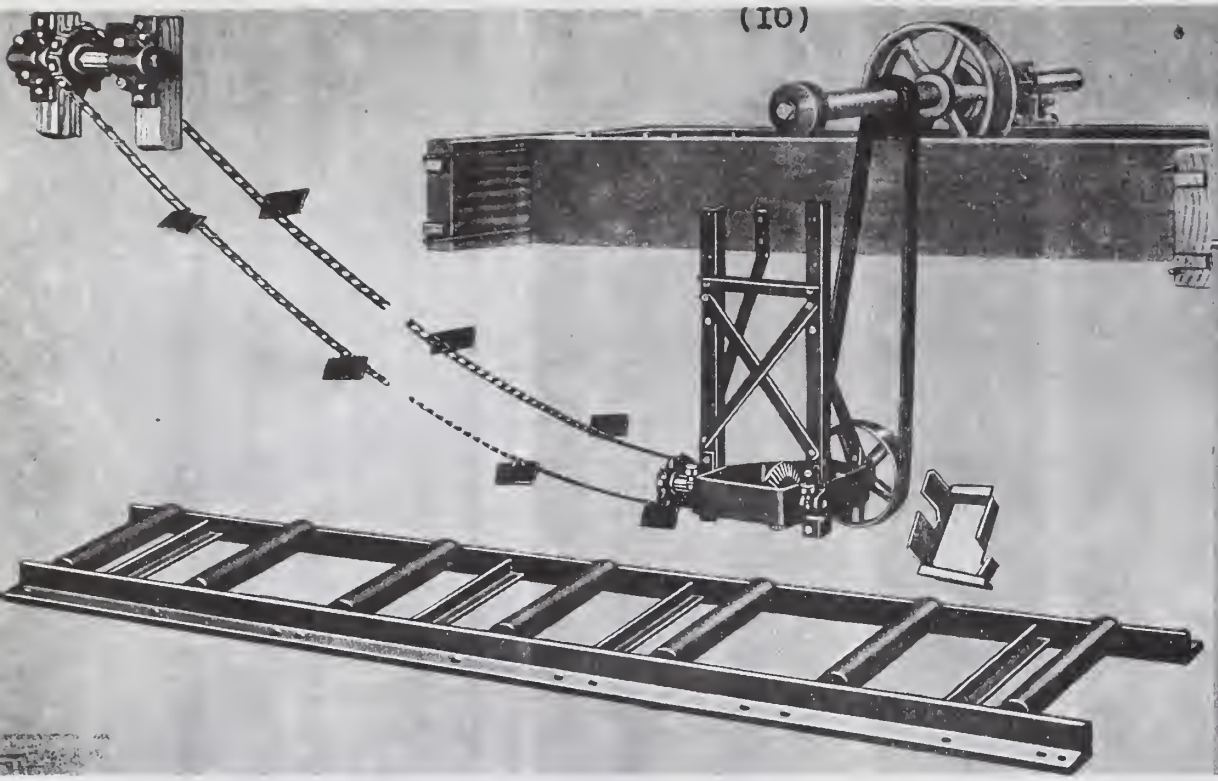
Width Inside Timbers	22 in.	24 in.	28 in.
Width Outside Timbers	29 in.	31 in.	36 in.
Size of Timbers	3 1/2 x 4 1/2 in.	3 1/2 x 4 1/2 in.	4 x 5 in.
Standard Number of Headblocks	2	2	2
Headblock Opening	34 in.	36 in.	40 in.
Headblock Pinion	Cast-Iron	Cast Steel	Machine-Cut Steel Teeth
Headblock Base	Steel	Steel	Steel
Headblock Knee	Cast-Iron	Cast-Iron	Cast-Iron
Headblock Rack	Cast-Iron	Machine-Cut Steel Teeth	Machine-Cut Steel Teeth
Truck Wheels Diameter	7 1/2 in.	7 1/2 in.	10 in.
Truck Wheels	Cast-Iron	Cast-Iron	Cast-Iron
Truck Bearings	Babbitt	Hyatt Roller	Hyatt Roller
Truck Axle Diameter	1 1/8 in.	1 1/4 in.	1 1/2 in.
Set Shaft Diameter	1 7/16 in.	1 11/16 in.	1 11/16 in.
No. of Trucks 15 ft. Carriage	3	4	4
No. of Trucks 20 ft. Carriage	4	6	6
No. of Trucks 25 ft. Carriage	5	7	7
Travel of Dog Socket on Bar	28 in.	28 in.	34 in.
Set Works	8-Pawl	12-Pawl	12-Pawl

WAYS

Width Overall	*No Woodwork of Ways*	39 in.	45 1/4 in.
Size of Timbers		3 1/2 x 4 1/2 in.	4 x 5 in.
Track Iron (Plain)		Steel	Steel
Track Iron (V-rail)		Steel	Steel
Track Iron (T-rail)		12-lb. Iron	
Size of Cable		3/8 in.	3/8 in.	7/16-in.
Cable 15-ft. Carriage		86 ft.	86 ft.	90 ft.
Cable 20-ft. Carriage		110 ft.	110 ft.	112 ft.
Cable 25-ft. Carriage		112 ft.	112 ft.	117 ft.
Brake H.P. Required Minimum		25	35	45

You can buy your Sawmill on Wards Time Payment Plan.

Catalog illustration courtesy Montgomery Ward & Co.



SAWDUST AND ROLLER CONVEYORS

Steel Frome Sawdust Conveyor. Most convenient and efficient method for removing sawdust from underneath saw and delivering it in a pile, where it is out of the way, or to a point near boiler for use as fuel. Sawdust is carried more than 30 ft. away from the saw but, by addition of extra chain and scrapers, the conveyor can be extended to any additional distance—two extra feet of chain will be required for each foot added to length of conveyor. Conveyor has a strong steel frame that is bolted to the husk timber, with additional metal braces attached on second timber. Power is taken from saw mandrel and transmitted by belt to pulley of conveyor; the right-angled transmission of power to the chain is through bevel gears. Comes equipped with all necessary head and foot sprockets, shafts and bearings, and sheet-metal gear housing. 60 ft. of malleable-iron chain is included to which the 15 steel scrapers, 2¼ by 5 in., are attached. 5 in. diam. by 3-in. face pulley on mandrel and 12-in. diam. by 3-in. face pulley on countershaft, and belting. For use with all Ward-Farquhar sawmills. *State model or mandrel diam.*

87 WS 3140F—Sawdust Conveyor. See Price List.

Roller Conveyors—Apply modern methods to a modern sawmill and you have a winning combination for making money. Tie in roller conveyors to the operation of your Ward-Farquhar sawmill and see how smooth the work goes from then on—how production steps up and costs drop to their lowest point. Use them at all points where lumber is ordinarily handled by expensive, wasteful, time-consuming manpower. Have boards fall from the saw onto a conveyor and slide on ball-bearing rollers directly to edger or trimmer.

Ward-Farquhar roller conveyors facilitate the handling of lumber in loading or unloading, or in delivery to any desired point. They are built for heavy-duty general-purpose work, with strong electrically-welded steel frames. Each conveyor section has seven 2-in. diam. by 16-in. long ball bearing rollers, so boards as short as 3½ ft. can be conveniently handled without stalling between rollers. Each section is 10 ft. long by 16 in. wide and supplied with connecting plates and bolts for making a conveyor of any length.

87 WS 2859F—Roller Conveyor. See Price List.

CUT-OFF SAW

Trims ends of lumber square and to length. Heavy steel mandrel has babbitted bearings and 6¾-in. diam. by 8-in. face pulley. Furnished with 8 ft. of 1 11/16-in. diam. steel shafting, 2 countershaft bearings, 28-in. diam. by 8-in. face countershaft pulley, and brackets for extra support to ceiling or rafters, as illustrated. Belt, saw and mitre gears shown are not included. Takes up to 30-in. saw with 1½-in. hole. Countershaft drive pulley not included.

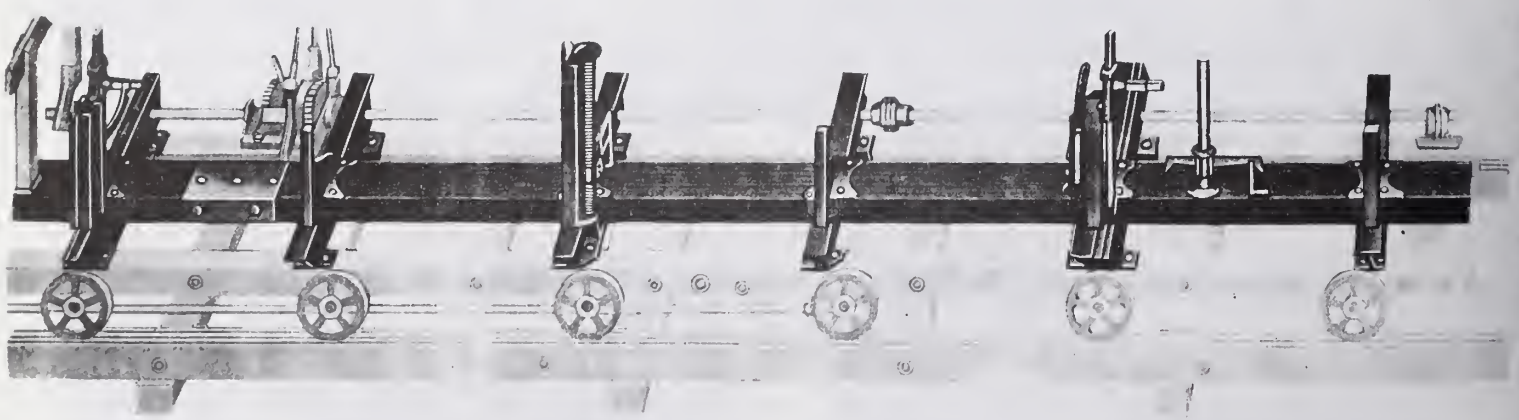
87 WS 3142F—Swing Cut-Off Saw. See Price List.

CONVENIENT CREDIT TERMS

As little as 10% Down . . . balance in convenient monthly payments . . . buys any of the equipment in this book on Wards Time Payment Plan.

This enables you to pay for your mill and equipment out of earnings instead of waiting until you have all-cash to get started.

The accompanying price list includes a table of Wards Time Payment terms . . . tells what your down payment is and the amount to send each month.



Ward-Farquhar Log Beam Carriage

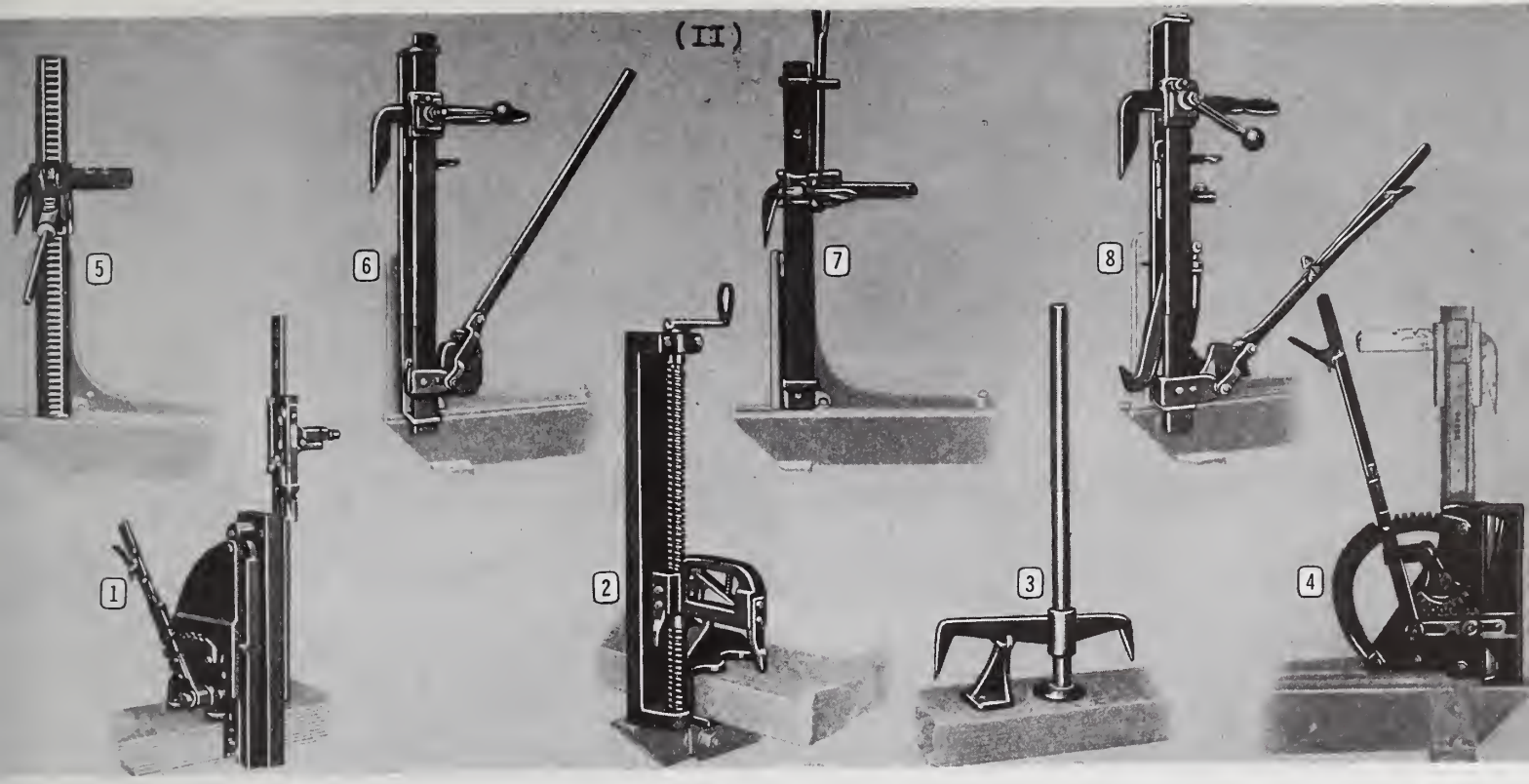
The Log Beam Carriage (also called Set Beam) is the type that is particularly adapted to the production of accurate lumber from long slender, springy and crooked timber. The particular difference between this and the headblock type of carriage is that the usual headblocks are replaced by a log-beam extending the entire length of the carriage. On the 15-ft. carriage, for example, the log beam is supported on the carriage by five steel bases. The ones at each end are steel cut rack-and-pinion bases and are operated by the set-shaft pinion through the set works, in the usual manner. The remaining three are plain steel bases that merely provide added support. On a 20-ft. carriage, two rack bases and four plain bases are provided. On the 25-ft. carriage there are three rack bases and four plain ones. Log Beam carriages are fitted with a larger number and a greater variety of dogs and equipped with or without set-outs for backing up crooked sticks so as to obtain the utmost productive footage from each log.

Log Beam Carriages are supplied for the Model-50 and 90 Ward-Farquhar Mills only, and can be ordered in lengths of 15, 20 and 25 feet. Each log beam carriage is fitted as standard equipment, with 2-last-board uprights, with pistol-grip dogs and setouts; 1 screw dog; 1 drop dog and blank knees, as follows: 2 on the 15-ft. carriage; 3 on the 20-ft. and four on the 25-ft. Additional dogging equipment, which can be placed on the beam in various positions and arrangements to suit the type of work being done, is offered on the opposite page. The log beam opening on the Model-50 mill is 32 in., and on the Model-90 is 28 inches.

Rack-and-pinion bases are equipped with safety stops that prevent the beam equipment from being run into the saw. Descriptions of the various styles and sizes of log-beam equipment appear on the opposite page. See Price List.

87 WS 2544F—Model-90L Mill. 15-ft. Log Beam Carriage.
87 WS 2545F—Model-90L Mill. 20-ft. Log Beam Carriage.
87 WS 2546F—Model-90L Mill. 25-ft. Log Beam Carriage.
87 WS 2547F—Model-50L Mill. 15-ft. Log Beam Carriage.
87 WS 2548F—Model-50L Mill. 20-ft. Log Beam Carriage.
87 WS 2549F—Model-50L Mill. 25-ft. Log Beam Carriage.

Catalog illustration courtesy Montgomery Ward & Co.



HEADBLOCK AND LOGBEAM DOGS

1 **Last Board Pistol Grip Dog**—Essentially a log-beam dog, used with upright knee with a special setout or taper attachment. Made for direct attachment to log beam; not adaptable to headblock mills. Pistol grip releases the dog and the bit sets itself for last board cut. See Price List.
87 WS 3148F—Last Board Pistol Grip Dog.

5 **Side-Operating Dog**—Furnished as standard equipment on all Ward-Farquhar headblock mills. It is strong, convenient, quick and positive in action and has the great advantage that it can be operated by either the sawyer or man on carriage. A slight outward pull on ratchet lever releases pinion and allows dog holder to move freely up and down; at the same time the bit is released and may be adjusted.
87 WS 3147F—Side-Operating Dog.

2 **Screw Dog**—Another of the log-beam group of dogs. The dog operates on a heavy, square-threaded screw and the bit is driven securely into the log by a turn of the crank.
The dog is released from its threaded spindle by a hand grip, which disengages the screw and allows the dog to slide freely up or down. The dog is also equipped with a second bit for holding 1-inch boards. See Price List.
87 WS 3149F—Screw Dog.

6 **Knight Single Dog**—A steel headblock type of dog, made of steel and is well known among sawmill men. The short ball-end lever at the side controls the dog bit. This lever also allows the bit to be set in close to the frame or, in cutting a large log, it can be pulled out. For Model 50 Headblock Mill only.

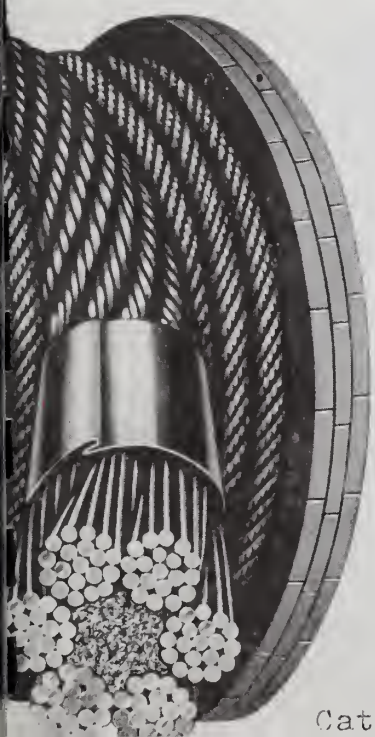
87 WS 3145F—Knight Single Dog.

3 **Drop Dog**—Used only on log beam type of carriage. Furnished as standard equipment on all log beam carriages and is the simplest to operate. The dog slides freely on its heavy steel standard. Either the short or long bit can be brought into play simply by turning it on the shaft. See Price List.
87 WS 3150F—Drop Dog.

7 **Pony Dog**—The universal type of dog for any type of headblock mill. Favorite with sawyers everywhere. Made of steel and malleable iron. Can be substituted for the regular side-operating dog that is furnished as standard equipment on all Ward-Farquhar saw mills. Wedge-type lock applies powerful leverage to bit. Position of bit is set by an independent locking lever. Especially adapted to use on light and medium mills.
87 WS 3144F—Pony Dog.

4 **Set-Out Attachment**—For added convenience when handling light, crooked and tapered logs, and quarter sawing of lumber. Latch-on quadrant positively holds setting. Made of cast and bar steel. For fast sawing a set-out attachment for each headblock is recommended. Can be attached to headblocks of all Ward-Farquhar mills.
87 WS 3143F—Set-Out Attachment.

8 **Knight Duplex Dog**—For use on Ward-Farquhar Model-50 mill only—the type of heavy-duty dog demanded by the heaviest kind of continuous operation. Basically the same as Knight Single Dog, the Double type holds log with top and bottom bits. The top bit is set by hand, and movement of hand-lever forces both top and bottom bits into the log. Especially useful for quarter sawing. See Price List.
87 WS 3146F—Knight Duplex Dog.



Plow Steel Wire Rope

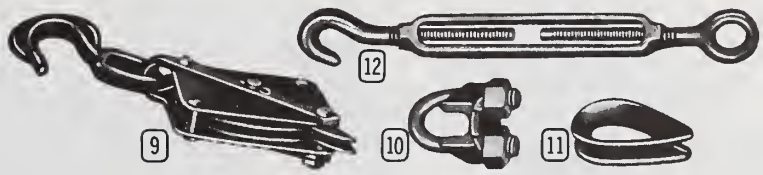
All Wards Wire Rope meets top specifications of the U. S. Government and Wire Rope Manufacturers' Association for strength and weight.
Made from 6 strands of 19 wires laid over a lubricated hemp core. Regular right lay.

Plow Steel Wire Rope—Ultimate Tensile Strength 225,000 lbs. per sq. in. Meets all U. S. Government and Wire Rope Mfrs. Assn. for Type XX. See Price List.
84 WS 6451L—Steel Wire Rope.

Size In.	Drum Dia. Advised: Recommended	Drum Dia. Advised: Minimum	Safe Working Load Lbs.	Breaking Strain Pounds
1/4	11 in.	4 in.	1060	5300
5/16	14 in.	5 in.	1560	7800
3/8	17 in.	6 in.	2300	11500
1/2	22 in.	8 in.	4000	20000
5/8	28 in.	10 in.	6200	31000
3/4	34 in.	12 in.	9200	46000
7/8	39 in.	14 in.	11600	58000
1	45 in.	16 in.	15200	76000

Best Quality—Improved Plow Steel Wire Rope—Ultimate Tensile Strength 250,000 lbs. per sq. in.—Meets all U. S. Government and Wire Rope Mfrs. Assn. specifications for Type XXIII. Highest grade and toughest cable made in this type construction. Has about 25% greater breaking strain than Plow Steel Type XX above. See Price List.
84 WS 6457L—Wire Rope.

Size In.	Drum Dia. Advised: Recommended	Drum Dia. Advised: Minimum	Safe Working Load Lbs.	Breaking Strain Pounds
3/8	17 in.	8 in.	2800	14000
1/2	22 in.	10 in.	5000	25000
5/8	28 in.	12 in.	7200	36000
3/4	34 in.	14 in.	10200	51000



Tackle Blocks for Wire Rope

9 Diamond-shaped, wrought iron shell, with single Steel sheave. Forged steel hook with strap and becket. Enamel finish. See Price List.
84 WS 6145M—Wire Rope Tackle Block

Diam. Sheave	For Rope
6 inches	1/4, 5/16-in.
8 inches	3/8, 1/2-in.
10 inches	5/8-in.

Wire Rope Clips

10 Malleable iron wire-rope clips, made with spiral corrugations on inside surfaces to prevent rope from slipping. Black japanned finish. In sizes for wire ropes 1/4 in., 5/16 in., 3/8 in., 1/2 in., 5/8 in., 3/4 in., 7/8 in. and 1 in. See Price List.
84 WS 6454—Wire Rope Clip.

Wire Rope Thimbles

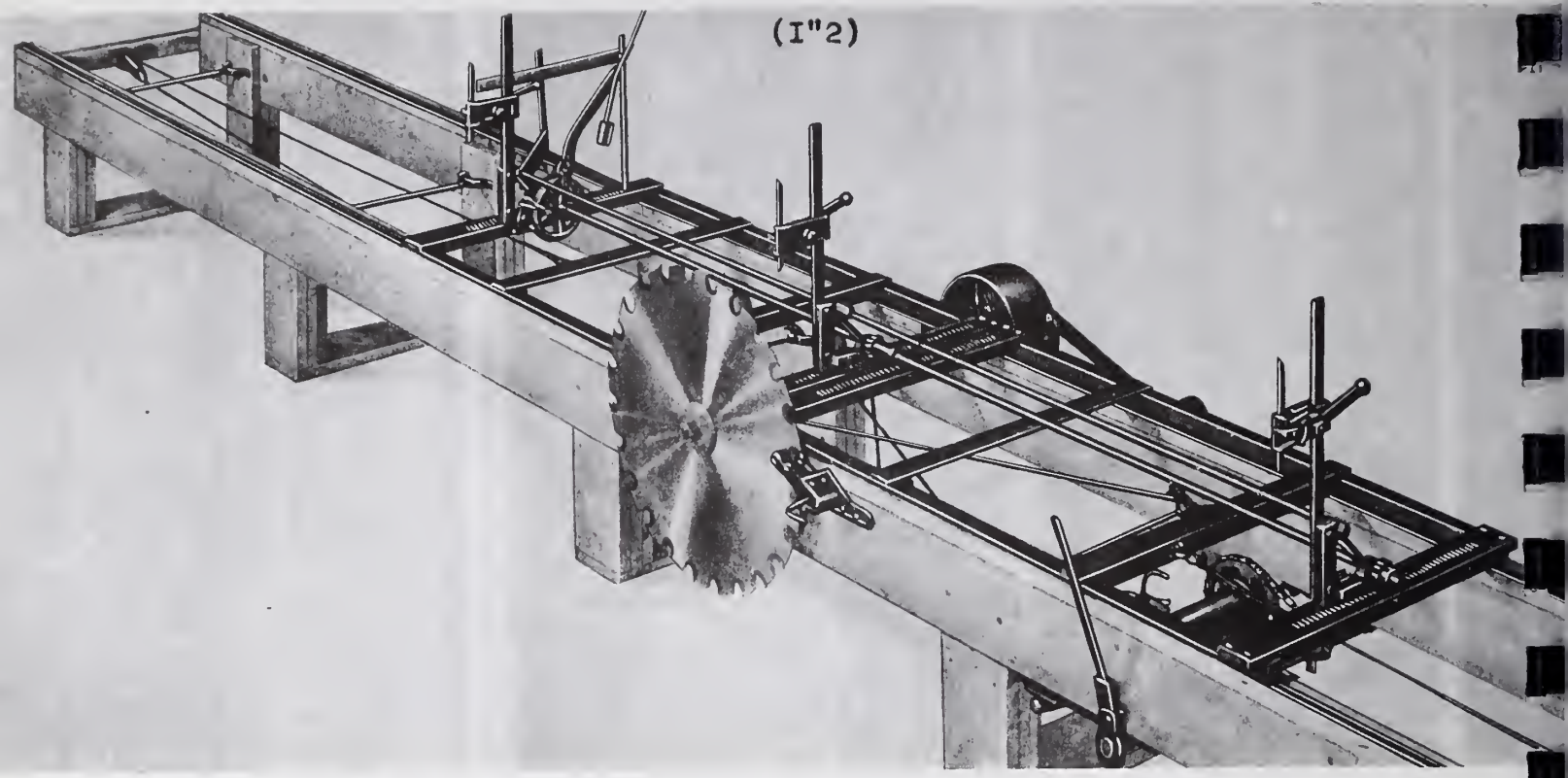
11 Heavily galvanized—protects wire rope when bent in eyes. Available in sizes for 1/4 to 1 in. steel rope See Price List.
84 WS 6455—Wire Rope Clip.

Forged-Steel Turnbuckles

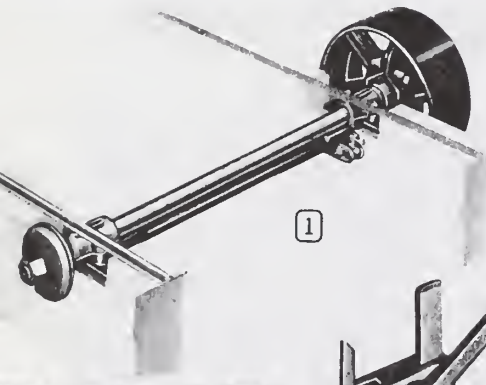
12 For taking up slack on wire line, steel cable or chain. Drop-forged steel body. Heavily galvanized to resist rust. With hook and eye, as pictured.
84 WS 6453—Turnbuckle.

Size	Take Up
1/4 in.	4 in.
5/16 in.	4 1/2 in.
3/8 in.	6 in.
1/2 in.	6 in.

Catalog illustration courtesy Montgomery Ward & Co.



WARDS PORTABLE FARM-TYPE SAWMILLS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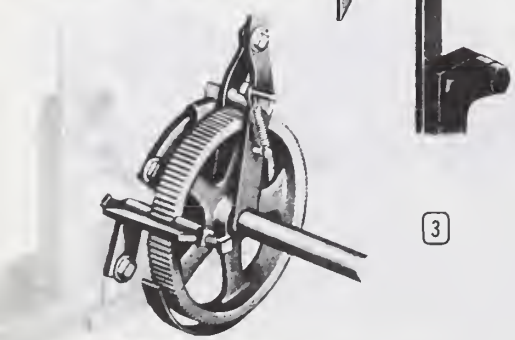
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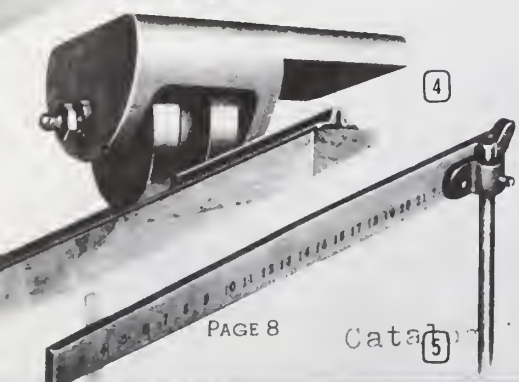
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Built to meet the specific need for a low-priced portable sawmill that will produce a medium amount of high-grade lumber with a minimum of power. Add to this that it is sturdily built throughout, can be operated successfully with no previous experience, and you have a thoroughly dependable sawmill.

RUGGED STEEL YOKED MANDREL (Picture 1)—1½-in. diameter and 54 in. long; is made of high-carbon alloy steel with turned and polished journals. Equipped with 6-in. tight and loose saw collars. Mandrel bearings-boxes are of the split babbitted type, have large oil reservoir. Bearing standards have slotted holes for adjusting lead of saw. SAW GUIDE—is bolted to the base—out where it is easily adjusted.

HEADBLOCKS—Consist of a heavy channel steel base and cast iron knees. Base is slotted to engage gears on set-works shaft. Slots are cut clear through—eliminate sawdust packing.

TOP DOGS (Picture 2)—Have easy 4-way adjustment for dogging heavy logs. Movement of single lever adjusts and sets dogs.

PRECISION SET WORKS (Picture 3)—The vital part on any sawmill. Enables operator to regulate the thickness settings with as fine as 1/16 in. accuracy—ratchet turns on 1-in. steel set-shaft, with pinions at ends to operate the knees. Overhead scale (Picture 5) shows thickness of set in ⅛ inches . . . easy to read . . . for making random cuts without disturbing the setting.

TRACK AND ROLLERS—Front guide-track (See Picture 4) is made of specially rolled steel with a high rib for the grooved guide rollers on the carriage. Rear track is flat. Two large dual-type grooved roller-bearing guide rollers and two intermediate support rollers at front (saw side). Flat rollers at rear are machined steel.

WOOD BASE—You build this yourself . . . plans give complete instructions. Base-hardware, tracks, brace and stay-rods, nuts, bolts and all necessary hardware and feed cable are included with all complete mills.

6-ft. Carriage Model

Saws logs up to 10 feet long, with 36-in. diameter Superior Quality swage-tooth saw, to run at 1000 R.P.M. Crown face mandrel pulley with 6¾-in. face; choice of 10 to 24-in. diameter furnished as required. Takes 6-in. belt (not included). Requires as little as 12 H.P. to operate.

Hand-Crank Manual Feed. Lever shifts spindle to engage either drive sprocket . . . 2 speeds forward . . . 2 reverse. Turning crank forward feeds log into saw . . . carriage gigs back fast or slow by reversing crank. See Price List.

87WS 2750F—Complete 6-ft. Carriage Mill as described above. Saws logs to 10 ft. long.

87WS 2756F—6-ft. Mill, as described above, but without saw, mandrel pulley or manual feed.

10-ft. Carriage Model

Saws logs to 14 ft. long. The same Ward Farm-Type Mill described above, fitted with carriage extenders (described on opposite page) to make a 10-ft. carriage and increase sawing capacity to 14-ft. logs. With 40-in. Superior Quality swage-tooth saw, 6¾-in. face mandrel pulley, (10-24-in. diam. furnished as required), and manual feed. Requires as little as 12 Brake H.P. See Price List.

87WS 2751F—Complete 10-ft. Carriage Mill as described above.

87WS 2778F—10-ft. Carriage Mill, as described above, but without saw, mandrel pulley or manual feed.

12-ft. Carriage Model

Saws logs to 16 ft. long. Has the Ward basic 6-ft. steel carriage, plus 6-ft. extension carriage and extra dog (described on opposite page) to make a 12-ft. carriage and extend cutting capacity of mill up to 16-ft. logs.

With 40-in. Superior Quality swage-tooth saw and mandrel pulley for 6-in. belt and 10 to 24-in. diam., as specified. *Standard Duty Power Feed* (described on opposite page). Requires as little as 22 Brake Horsepower. See Price List.

87WS 2783F—Complete 12-ft. Carriage Mill, with saw, mandrel pulley and Standard-Duty power feed.

87WS 2760F—12-ft. Carriage Mill described above but without saw, pulley or power feed.

16-ft. Carriage Model

Saws logs up to 20 ft. long. Basic 6-ft. mill, equipped with extension carriage and extra dog and carriage lengtheners to make a 16-ft. carriage. Equipped with Heavy-Duty Power Feed (described on opposite page); Wards 40-in. Inserted-Tooth Saw and mandrel pulley for 6-in. belt, size 10 to 24-in., as specified.

87WS 2784F—Complete 16-ft. Carriage Mill as described above, with Heavy-Duty power feed, 40-in. inserted-tooth saw, and pulley.

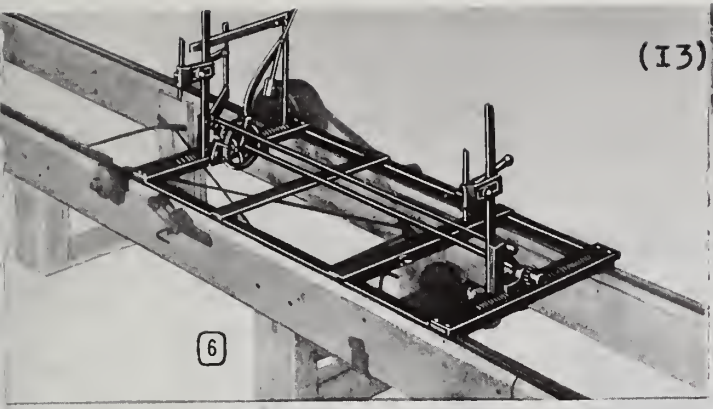
87WS 2785F—16-ft. Carriage Mill above, but with Wards 48-in. Inserted-Tooth saw.

87WS 2761F—16-ft. Carriage Mill above, but without power feed, saw or mandrel pulley.

NOTE—Base must be at least three times as long as the sawmill carriage. All necessary instructions, drawings, dimensions, track and hardware are included with your order.

When a short-base mill is extended to increase its sawing capacity it is necessary to include a complete new cable for the carriage feed because it is impracticable to splice additional lengths of wire rope to the original cable. To get the correct length of cable needed, multiply the overall length of the sawmill base by two.

Catalog illustrated courtesy Montgomery Ward & Co.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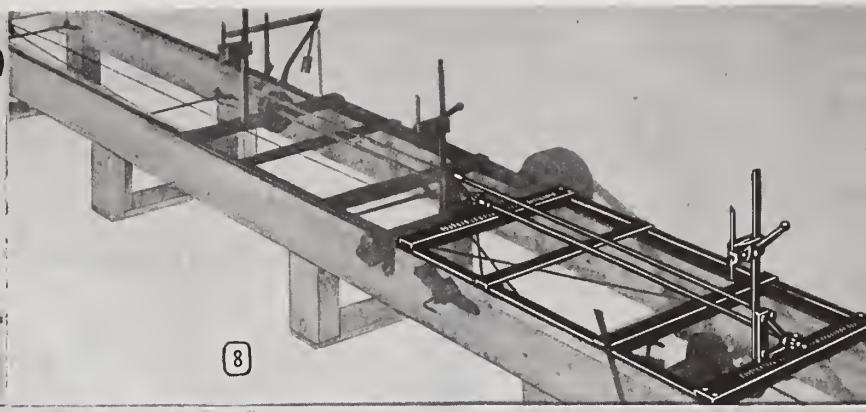
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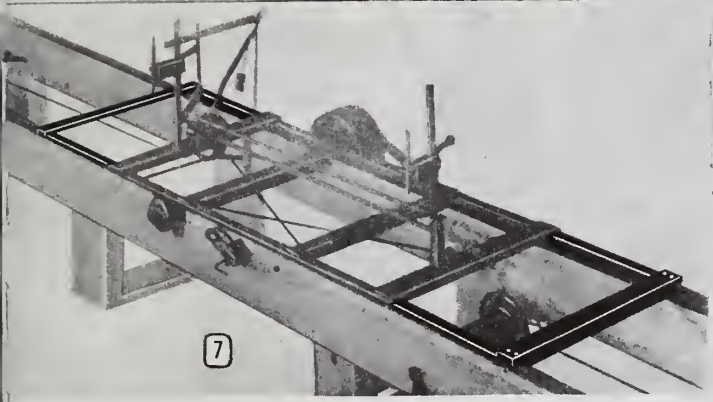
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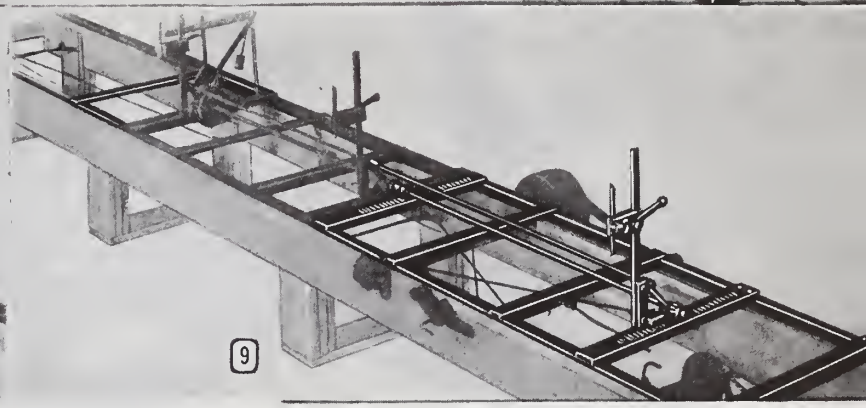
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—HANDLE LOGS UP TO 20 FT. LONG

Extension Carriage and Extenders

Start with the Basic 6-foot Carriage shown in Picture 6, that saws logs to 10 feet long. Adding the Carriage Extenders (Picture 7), adds 4 feet and extends capacity of carriage to 14-foot logs. Addition of the Extension Carriage and extra dog (shown in Picture 8), makes a 12-foot carriage and increases capacity of your mill to handle 16-foot logs. By adding the Carriage Extenders and the Extension Carriage to the Basic 6-foot carriage (see Picture 9) you will have a 16-foot carriage that will handle logs to 20 feet long. See Price List.

87WS 2786F—Basic 6-ft. Steel Carriage (Fig. 6).

87WS 2802F—Steel Extension Carriage (Fig. 10) Complete. Adds 6 ft. to length of carriage.

87WS 2803F—Carriage Extenders (pair) (Fig. 11) Complete. Adds 4 ft. to length of carriage.

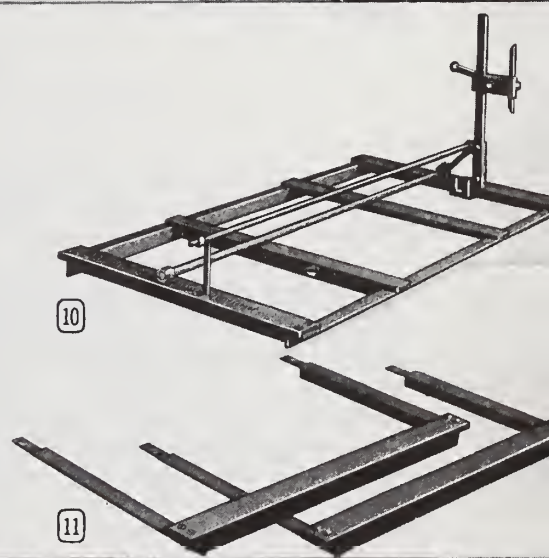
Sawmill Encyclopedia

(For Wards Farm Type Sawmills)

24 Pages, with detailed drawings and directions for building your wood base, and hundreds of valuable sawing hints is mailed to you from the factory on receipt of your order for a Ward Farm Type Sawmill. Purchased alone, the price is $5, which is refunded when you buy $35 worth of Ward sawmill parts.

87WS 2826K—Encyclopedia—See Price List.

ALSO—Buyers of Farm-Type sawmills receive a valuable quarterly publication at no extra charge.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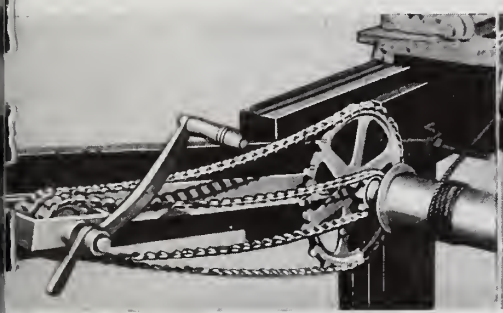
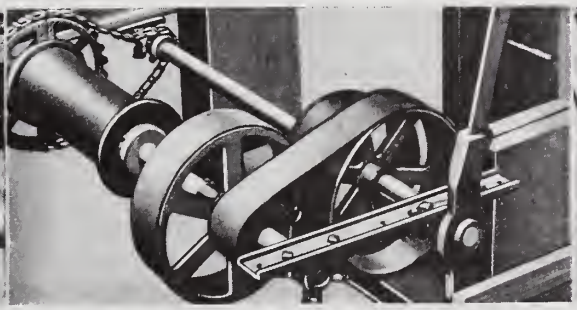




Manual Feed

Power-Save Feed for use on Ward Farm-Type mills only, eliminates disadvantage of pushing and pulling carriage by hand . . . all engine power can be used for sawing.

Cable from carriage is coiled around feed drum. Lever shifts spindle to engage either drive sprocket . . . gives two speeds forward . . . two in reverse. Turning the crank forward gives slow speed for big logs—fast for lighter cuts. Carriage gigs back fast or slow by reversing crank. Feed cable not included. See Price List for ¼-in. Cable.

Feed control can be installed just in front of the saw, if preferred. An extra return sheave is required at the head for this arrangement, which is best for shingle making.

87WS 2851F—Manual Feed Assembly. See Price List for prices and shipping information.

Standard Power Feed

Fits any Ward Farm-Type sawmill . . . requires about 10 additional H.P. to operate. Control-lever moves the countershaft, at right, to engage with either the belt drive or the friction pulley.

When control lever is thrown to the right, the drum is driven in feed direction at slow speed. When lever is moved to the left, drum is driven in gig-back direction at three times the forward speed. When the lever is vertical the drum is not operating and the carriage remains stationary. The feed liveshaft is belted to an outboard pulley on the saw mandrel. Feed assembly includes drive belt, belt tightener, live-shaft pulley, mandrel pulley, to give feed speed up to ¾ in. per saw revolution. Feed cable is not included. See Price List for ¼ inch cable.

87WS 2852F—Standard Duty Power Feed. See Price List for prices and shipping information.

Heavy-Duty Power Feed

For heavy commercial production, where wider range of feed speeds is desired than provided by the Standard Duty Power Feed shown at left. Gets biggest production from your Ward Farm-Type Sawmill. Requires abou 10 more H.P. to operate than hand feed.

Heavy shafts turn in babbitted bearings—grease-cup lubrication. Control lever throws idler pulley to tighten looped belt for feeding log to saw . . . or to tighten straight belt for gigging back . . . three times faster than feed.

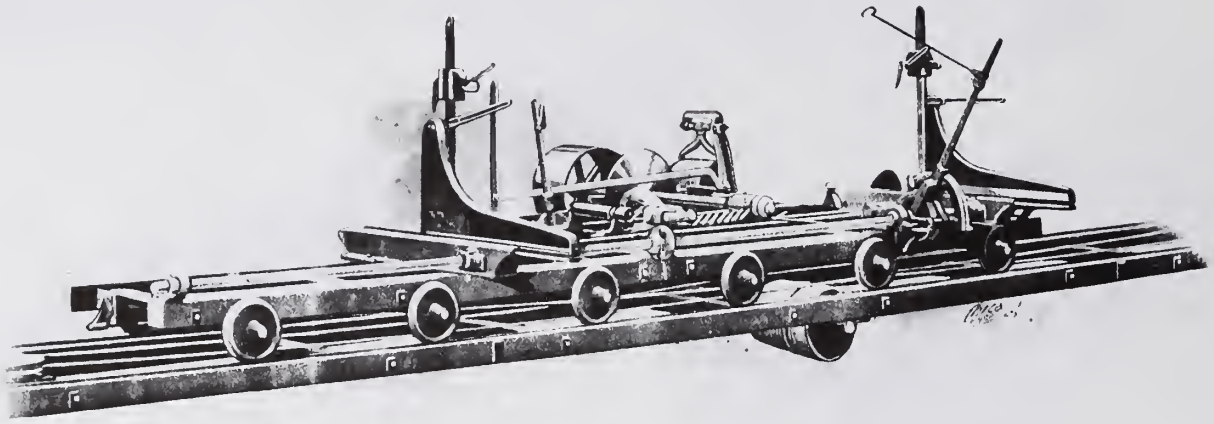
Feed Cable is not included with Heavy-Duty Power Feed. See Price List for ¼-in. cable.

87WS 2853F—Heavy-Duty Power Feed, with 4-in. outside mandrel-to-feed belt, and outboard belt tightener. See Price List.

Use Wards Time Payment Plan to buy your Sawmill and Equipment

Catalog illustration courtesy Montgomery Ward & Co.

The Enterprise Saw Mill

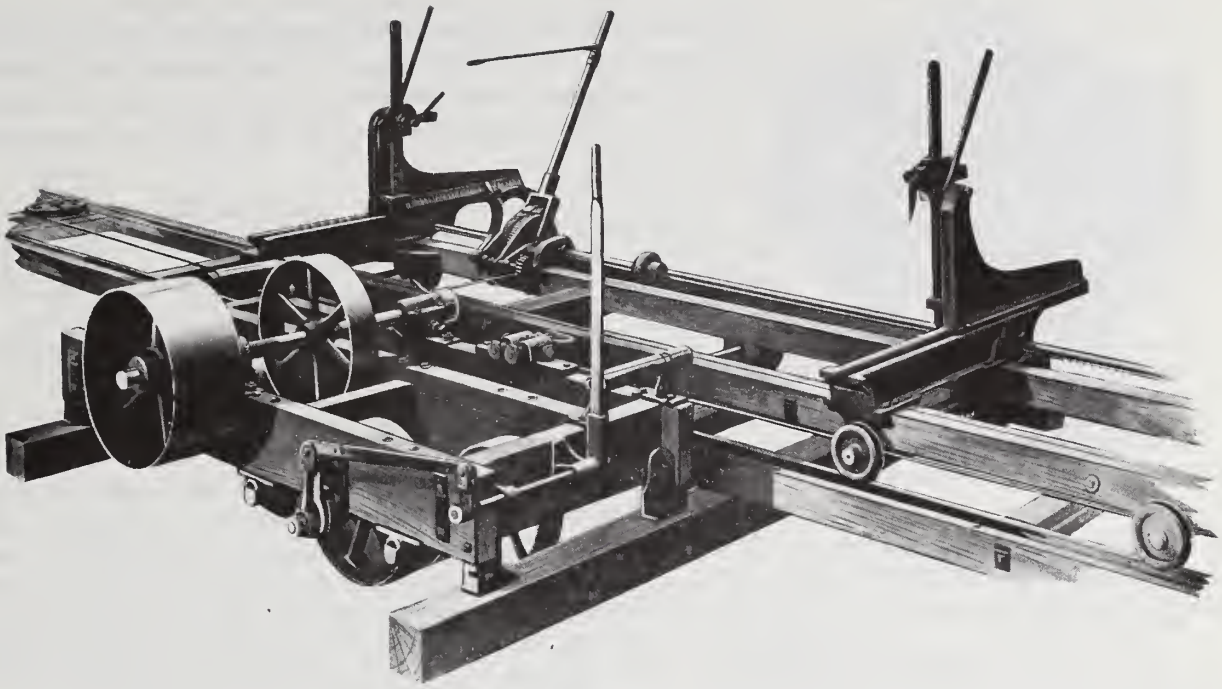


Cut of Variable Feed Mill, rear view, with Standard Carriage outfit.
(Any length of carriage can be supplied and any number of head blocks.)

CAPACITY

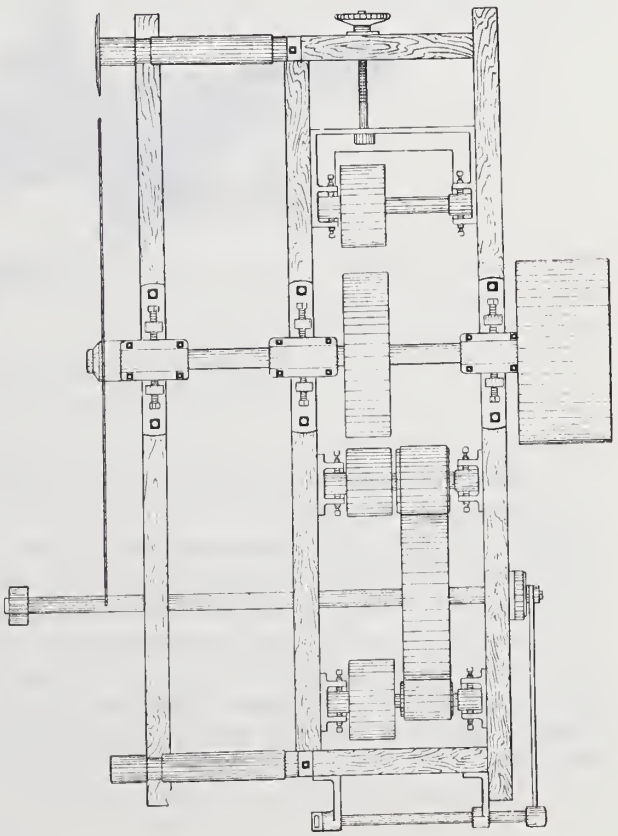
As to the capacities of portable mills, this varies greatly with the same sized mills operated under different conditions or in different kinds or species of woods, the amount of power used and the manner of supplying the logs to the saw. Most manufacturers greatly over-rate the capacities of their mills, but the following table is a conservative estimate under normal conditions: a No. 1 mill with a 10 h. p. engine will cut about 2,000 ft. of lumber per day of ten hours, with a 15 h. p. engine about 3,000 ft.; a No. 2 mill with a 10 h. p. engine will cut 3,000 ft., with a 20 h. p. engine about 8,000 ft.; a No. 3 mill with a 12 h. p. engine will cut about 4,000 ft., with a 25 h. p. engine about 10,000 ft.; a No. 4 mill with a 15 h. p. engine will cut about 5,000 ft., with a 40 h. p. engine about 15,000 ft.; a No. 5 mill with a 20 h. p. engine will cut about 7,500 ft., with a 50 h. p. engine about 20,000 ft. Many of our customers have exceeded these outputs by over 25%; others have driven their mills with much less power, getting equal results with those stated above. This point, however, we wish to make clear. Our mills will cut as much, if not more, lumber with the same power than any other mills of the same size on the market, being heavier and much stronger proportionately with less frictional resistance.

The Variable Friction Feed as used on the No. 1, 2, 3, 4 and 5 Mills is original with us, and due to the popularity it has attained in every section, places it at the head of the list as a good feed for Portable Saw Milling. The principle features which make it so popular are: A variation in feed from $\frac{3}{4}$" to 5" and gig back at 9" per revolution of saw mandrel; Easy to control while carriage is in motion; Controlled by two levers having short motion; Causes no end thrusts or strains on the mandrels, thus interfering with the accurate running of the saw; Absence of high-speed sprockets, shafts working out of alignment, clutches, springs, and such undesirable features of design that are troublesome and wear out quickly. Another commendable feature is that when the carriage is stationary, the disk on the mandrel is in a neutral position so that none of the feed or gig mechanism is running. The design followed in building this feed and gig arrangement to obtain so many desirable features of operation, consists of a disk which slides on a feather key in the mandrel, two friction wheels on each side of the disk, one to feed the carriage forward and the other to gig it back, two sets of bevel gears that transmit the power from the friction wheels to the feed shaft. Two levers operate this, one of which shifts the disk on the mandrel between the friction wheels, and the other controls the rate of carriage travel by shifting the feed friction in its point of contact with the disk. By placing the feed friction in contact near the center of the disk gives the carriage a slow feed and near the rim of the disk a fast feed. The motion of these two levers are short and therefore easily and quickly operated, which can only be appreciated by any one operating a mill controlled by one lever with a long sweeping motion for every motion of the carriage.



Mills No. 1½, 2½, 3½, 4½, and 5½, with Giant Belt Feed
Using same carriage outfit as No. 1, 2, 3, 4 and 5 Mills.

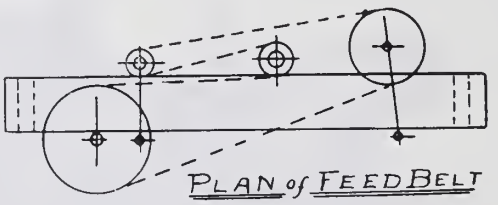
The Giant Belt Feed as used on the No. 1½, 2½, 3½, 4½ and 5½ Mills is too well known everywhere to need any explanation. We are using this design of feed on our heavier mills for stationary purposes and it is particularly suitable for heavy power or where the logs to be sawed run somewhat uniform in size. No variation is obtained other than slipping the frictions so one lever gives every control of the carriage through a short motion. Unless otherwise specified we supply this feed so that the carriage travels 4½" per revolution of saw and recedes carriage 10½".

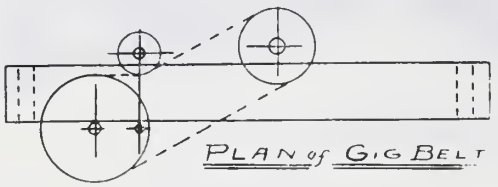


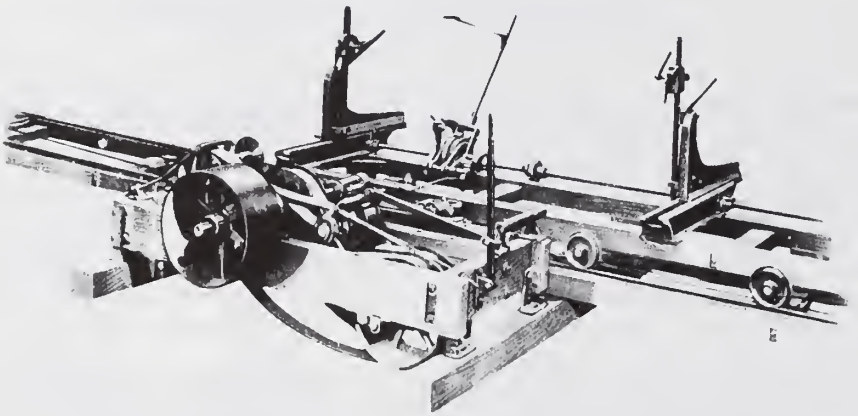
In the construction of this feed, one long belt drives two friction wheels in opposite directions on each side of a bull wheel fastened on the feed shaft. The feed shaft is held in an eccentric bearing controlled by the sawyer's lever which engages the bull wheel against either friction wheel thereby giving the forward and backward motion of the carriage. The shafts containing the friction wheels are held in adjustable, self-oiling bearings so that the frictions can be placed as near the bull wheel as desired. The belt is kept at constant tension by the use of a tightener

controlled by a hand wheel and screw at the rear of the saw frame. With this feed we put a third bearing in the saw frame for the mandrel which eliminates all strains of the belt pulling on the mandrel.

The Frictionless Feed as used on the No. 10, 20, 30, 40 and 50 Mills is the latest addition to our line. We thoroughly tested this feed in various localities and found it to meet with our expectations in the most satisfactory manner. No friction wheels are used in this feed but the power is transmitted from the mandrel to the feed shaft with belts entirely. These belts lay loose on the pulleys so that no shafts are in motion when carriage is not in motion. The feed is controlled by one lever which is connected directly to a double tightener pulley which acts on either the feed belt or the gig belt. To feed the carriage forward the feed lever is drawn back toward the operator which pulls the tightener on the feed belt. The tighter the lever is pulled the faster will be the rate of feed till the maximum of 5" is reached. By shoving the lever forward, the feed belt is released and the gig belt is tightened, giving a reverse motion to the carriage of 12 inches per revolution of saw. The large surface the belts have on the pulleys give a positive action, easily controlled. We particularly recommend this feed for cutting small logs, or when an operator desires a rapid motion to the carriage. The absence of gears in this feed gives the carriage a rapid, easy and quiet motion, and due to the slipping of the belts the reversing of the carriage is cushioned.

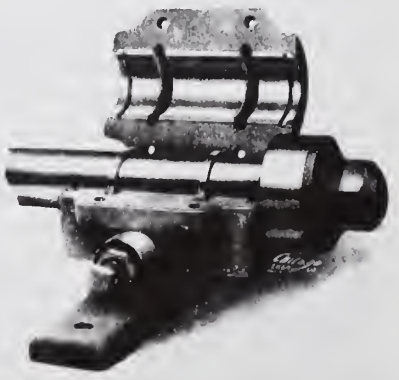




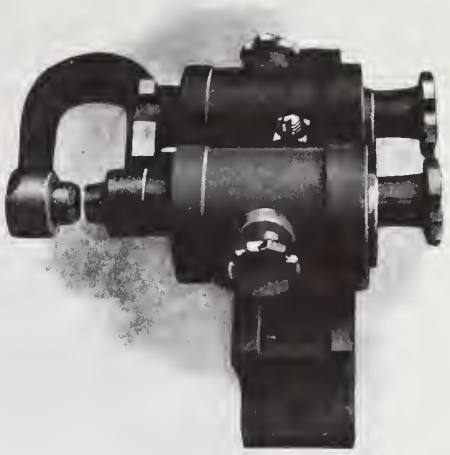


Mills No. 10, 20, 30, 40 and 50, with frictionless Belt Feed.
Using same carriage outfit as No. 1, 2, 3, 4 and 5 Mills.

Mandrels used on all mills are solidly forged so that we fully guarantee the collars to give no trouble. Before the final grinding, all key-ways are cut which reduces all possibilities of springing. The collars are drilled to take the standard saw: i. e., 2" eye with two lug pins on three inch circle equally spaced. The mandrel runs in a ring self-oiling bearing held in adjustable bases which enables the operator to keep the mandrel in proper alignment at all times. The bearings are closed on top, keeping grit and dirt out, yet are easily filled with oil. The way it is made it cannot heat or give trouble.



Saw Guide as used has been associated with our mills for years and has become popular among all who have used them as a safety guide. No wrenches are needed to adjust this guide and there is no need of getting your hands near the business end of the saw when making necessary adjustments.



Rollers and Splitters. At the sawyers end of the frame we furnish a roller made in two sections, and at the rear of the frame the small section of roller is substituted with a combination roller and splitter. These rollers and splitters are turned off entirely with the holes machined and running on polished shafts. We merely make mention of this to show that our mills are accurately built and not constructed from rough castings without the use of any machine tools.

Splinter Guards are put on the frame between the saw guide and mandrel to keep bark and short slabs from wedging between saw and frame timber.

The Belt Tightener is a regular attachment on all mills except the two smaller sizes. This tightener pulley swings in a frame that hangs directly on the stand which fastens to the saw frame. The shaft on which this frame swings is adjustable so that the tightener can be adjusted to the middle of the belt and thereby hold the belt to the center of the drive pulley.

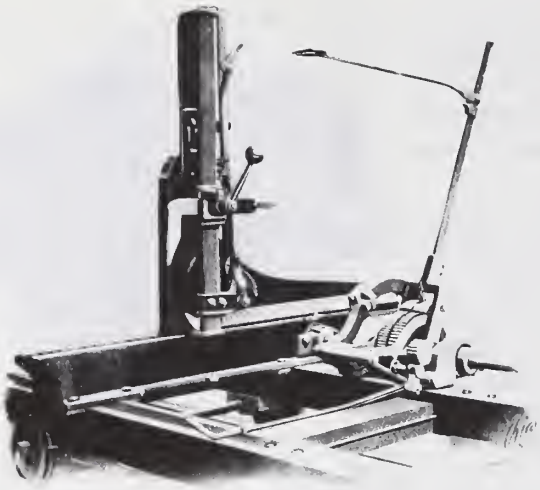
The Husk Frames of all mills are large so as to allow the use of large saws, and of sufficient weight to be absolutely rigid. Besides being gained out and mortised, long bolts are used to run from side to side and end to end. The legs at the four corners hold the frame above the moisture of the ground and saw dust, and thoroughly brace the frame from twisting. Attachments are supplied to fasten the track-ways to the frame legs, which holds these two members in alignment with each other.

CARRIAGE EQUIPMENT

On the various sizes of mills regardless of the feed arrangement used, the carriages are the same and take the same equipment. The carriage timbers are made of long leaf yellow pine, well braced, and bolted with through bolts from side to side. Both corners of timber next to saw and the inside corner of the outside timber, are bound by flat irons which act as a guide for the head blocks and keep the corners of the timbers from becoming damaged and broken off.

Some improvements have been made over the previous designs of the carriages. We make them some narrower which makes them less liable to rack loose and then place the outside carriage wheels on the outside of the carriage timber. This makes the track slightly wider and therefore easier leveled and more accurate in guiding the travel of the carriage. This arrangement further removes all possibility of the carriage tipping when running the knees back. When turning a log with a turner, if the carriage does lift a little it will fall back in its proper place, while if the wheels were on the inside of the outer carriage timbers, the carriage would be inclined to get off the track.

Carriage Axles and Wheels. The axles, (made of polished shafting,) run through from side to side. The wheels are large in diameter and fastened on the extreme ends of the axles, while the self-oiling axle bearings are immediately inside of the wheels. These bearings are adjustable side ways so that all lost motion can be taken up. The wheels next to saw are double flanged to fit over the 8 lb. T rail while the rear wheels are single flanged and run on a flat rail.



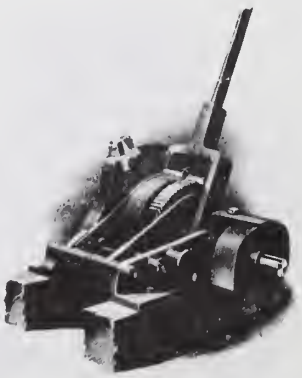
Boss Set Duplex Dog and New Style Head Block

Head Blocks. All sizes of mills are equipped with the new semi-steel tongue and groove head blocks. These blocks are extremely rigid, with heavy tongues, and well re-enforced on the nose, the points most liable to break. The set shaft bearing is adjustable so that the knee pinion can be kept in proper mesh with the rack in knee. The knee rack and pinion are each shrouded so that it is next to impossible to break out a tooth. The knees are of medium height, and extremely rigid although not clumsy in weight. On the knees are mounted our regular single dogs which are double quick in operation and very durable. The duplex dog can be furnished as shown at slight additional cost, which are most suitable for quarter sawing or for holding icy logs.

Shove Outs can be supplied on all sizes of head blocks when so ordered at a slight additional charge. These are indespensible on any mill for they do away entirely with the use of blocks for taper sawing or cutting logs larger at one end than the other.

Shove Outs

Set Works. Special attention is particularly called to this set for it is an entirely new design that has worked out so well that we have discontinued making all other styles of sets except the double-acting style. The manner in which it is operated adds more to the speed of sawing than any design of set we have ever offered. It readily adapts itself both for the sawyer or setter to operate and for the latter, there are no chains, small levers, or other obstacles on the set lever to interfere. Also instead of the regular receding attachment, we can also use the spring to recede when desired.



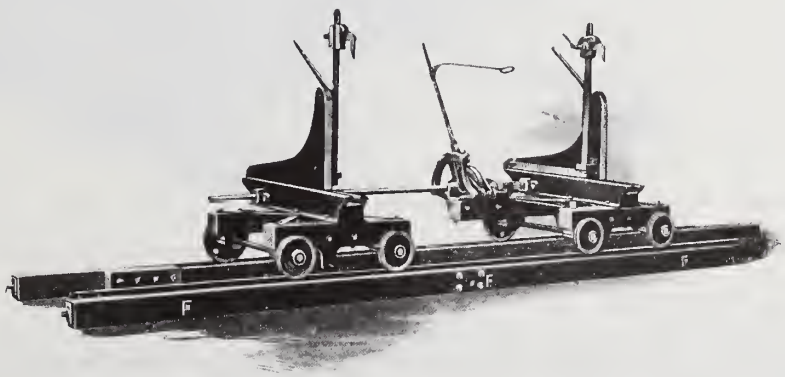
The set wheel is of cast iron with a high point carbon steel rim shrunk into place into which the set teeth are machine cut. The spacing is thereby accurate so as to correspond with the travel of the knees per revolution of the set shafts. One single broad faced pawl is used which is made of tool steel and hardened in oil. Running loose on the set shaft besides the set wheel is the receding wheel. On the inner side of the rim of this wheel is an internal gear which drives the reced-

ing gearing so that when the trip lever throws out the forward pawl, the receding pawl drops in contact with the receding wheel so that when the set lever is operated in the same manner as when working the knees forward, the knees are receded about three times faster than the forward motion. The trip lever regulating the forward and backing pawls is easily operated by the sawyer or setter.

The set arch has a number of pin stops so spaced as to set by the quarter inch. At the end of the throw of the lever, three leaves are provided each of which regulates the stopping of the set lever by sixteenths. This set working as a whole is the most accurate set that has ever been offered the trade for a portable saw mill and yet is easily and quickly operated. With wearing parts made of hardened steel having four times the wearing surface of any other set, its durability cannot be questioned.

Carriage Drive. The rack and pinion or the cable drive can be had at the option of the purchaser. Both are so attached to the carriage as to apply the driving power in a direct line with the line of weight carried by the carriage. The drum used with the cable drive is of cast iron, turned and grooved to receive the cable so that the sides of the cable cannot rub together. Those who have used the wood-drum will appreciate this feature, for with the wood faced drum the cable will cut its own grooves and as the cable wears it becomes smaller in diameter so that the grooves are too far apart for the next lap of cable. When the flat faced iron drum is used, the cable will flatten and crush so that while the turned and grooved iron drum is much more expensive, we use it because it is the best. We recommend the cable drive in preference to the rack drive, due to its smoother running, and because the carriage can be run further to either end of the track.

Truck Carriages can be supplied when desired by the purchaser, but can only be used in connection with the rack and pinion drive. This style of carriage is original with us and to those desiring a light, handy mill for small job sawing, the truck carriage will appeal. This carriage can be furnished with any number of trucks and is equipped with our regular style of head blocks, dogs, and set works which can be set at any distance from each other, as desired.



Truck Carriages

SPECIFICATIONS

Size of Mill	FRAME								CARRIAGES					
	Largest Saw Will Swing	MANDREL		DRIVE PULLEY		FRAME			Head Blocks Open	CARRIAGE WHEELS		Carriage Timbers	Track Timbers	Outside Width Track Timbers
		Diam.	Lgth. Bearing	Diameter	Face	Length	Width	Depth		Diam. Front Wheels	Diam. Rear Wheels			
	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
1 1½ 10	54	2 1/4	7	23	8 or 10	76 90 92	38	10	28	6	8 3/4	4½x5¼	3½x5	32½
2 2½ 20	54	2 1/4	7	23	8 or 10	76 90 92	38	10	32	6	8 3/4	4½x5¼	3½x5	38
3 3½ 30	64	2 3/4	8	23 or 27	10 or 12	96 104 105	46	12	36	8	10	5 x5	4 x6	42
4 4½ 40	72	2 1/2	8	23 or 27	12 or 14	96 105 106	54	12	40	8	10	5 x5¼	4 x6	46
5 5½ 50	72	3	10	23 or 27	12 or 14	105 118 118	54	12 1/2	44 or 48	8	10	5½x5½	4 x6	50 or 54

SPECIFICATIONS

Length of Carriage	Numbers and Length of Carriage Sections	Feet of Cable with Cable Drive	Feet of Rack with Rack and Pinion Drive	Sections of Finished Track in Feet
Feet	Feet	Feet	Feet	Feet
10	1—10	94	16½	2—16 and 1—8
12	1—12	96	21½	2—16 and 1—8
16	1—16 or 2—8	106	27½	3—16
20	2—10	110	31½	3—16
25	2—12½	115	37½	3—16 and 2—8
30	2—15 or 3—10	120	45	5—16
36	3—12	126		5—16 and 2—8
40	2—15 and 1—10	130		7—16
50	As Specified	140		9—16

NOTE—On all sizes of mills excepting the two small sizes, we include a belt tightener and stand that bolts to saw frame, wheels and axles for lumber truck, two cant hooks, side file, oil can, belt punch, mandrel wrench, monkey wrench, as a regular equipment.

Two cant hooks, side file, oil can, belt punch, mandrel wrench, and monkey wrench are regular. Parts that are included as regular on other sizes are subject to extra charge when wanted on these smaller mills.

On the No. 4 and No. 5 Carriages, an extra heavy type of head block can be supplied when required and the double acting style of set works when so ordered but subject to extra charge.

The top saw is an extra attachment on any size mill.

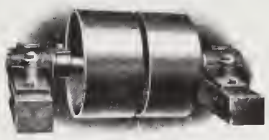
CABLE AND BULL CHAINS

Long length cable chains furnished in any desired size from ¾" x 6" to 1½" x 8" pitch; log dogs of either cast steel, semi-steel or cast iron furnished to suit requirements.

Sprocket for Cable Chains

SPROCKETS, DRUMS AND IDLERS

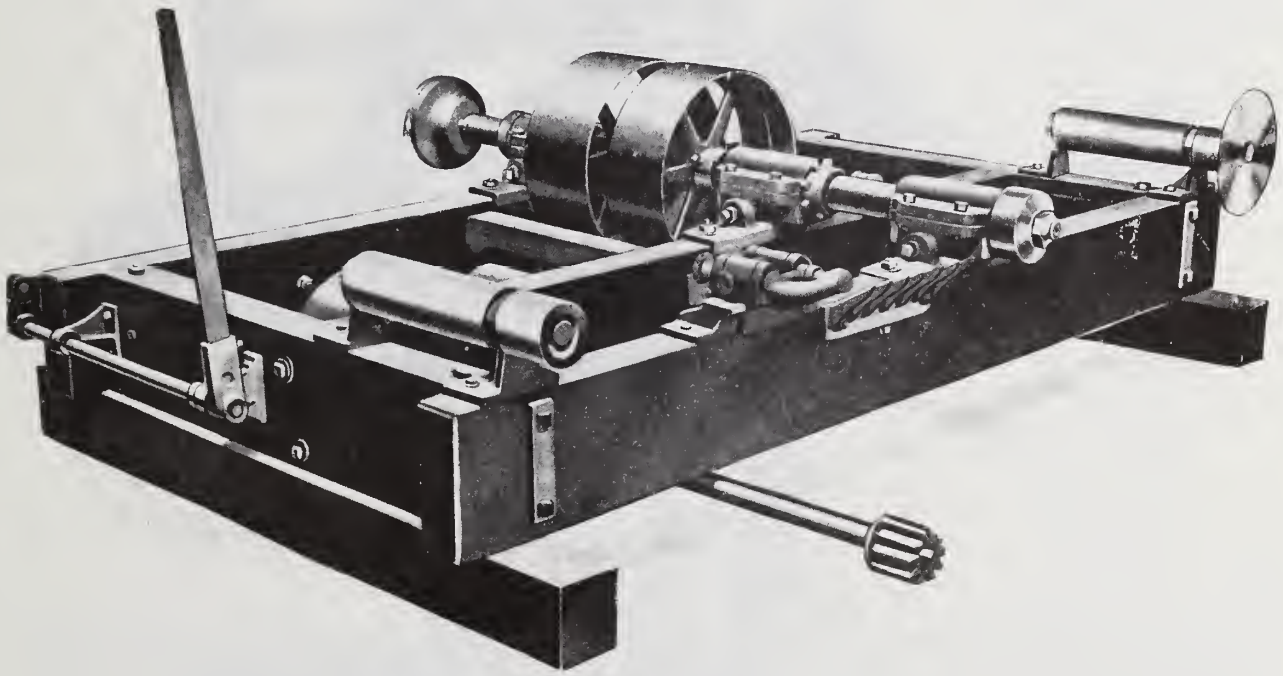
Sprockets either with inserted teeth or solid teeth, also solid teeth idler sprockets, and foot drums, complete with shafts and boxes furnished to suit requirements. We usually furnish special drawings for different installations, depending on the size of the logs to be handled, and the height and length they are to be drawn to.



Idler Drum for Cable Chains

ENTERPRISE HEAVY DUTY CIRCULAR SAW MILLS

Nos. 6, 7 and 8



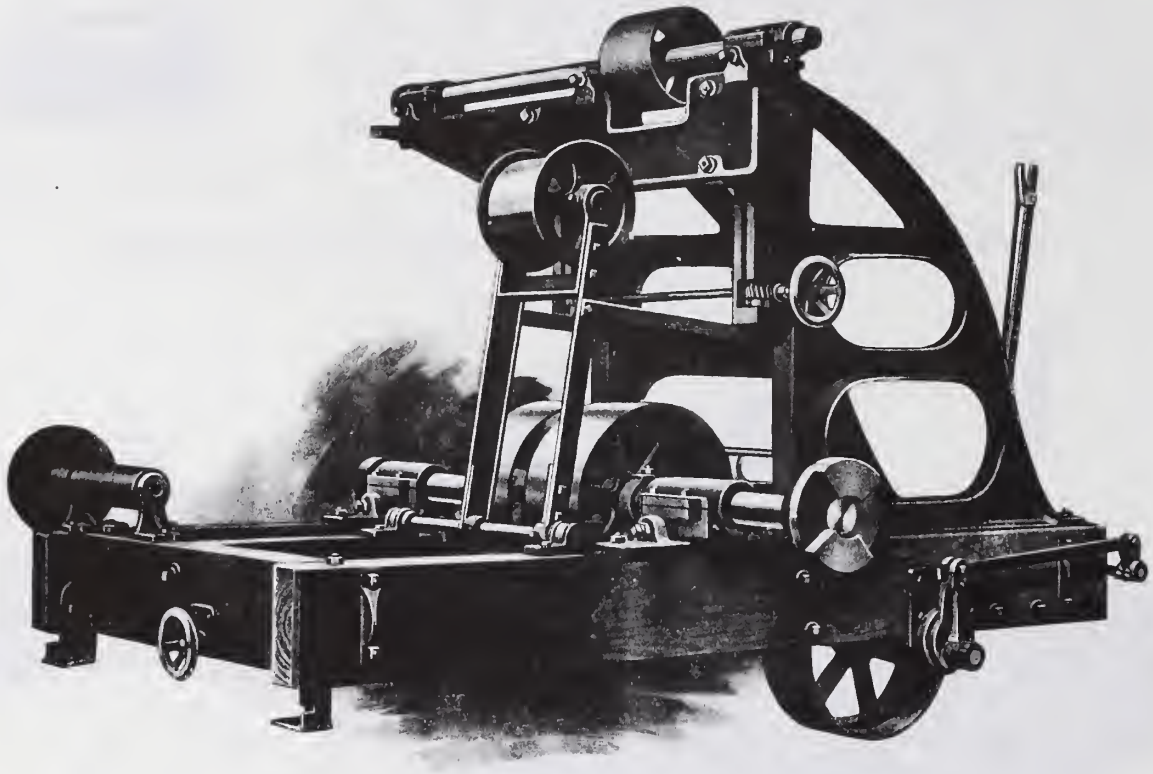
Husk of No. 6, 7 and 8 Mills

These husks are designed to stand the hardest kind of service. The frames are very heavy, and thoroughly braced and bolted together with heavy iron bolts running lengthwise and crosswise of frame. The mandrel which has a solid forged collar is not only turned, but afterwards ground in a grinding machine, thus insuring the greatest accuracy. This mandrel runs in three large, heavy, self-oiling bearings mounted in a swivel so that very accurate adjustments can be made. Lumber rolls and splitter are carefully turned and run on polished shafting. Only the best of material and workmanship are used in the construction of these mills. The table of specifications on page 20 will give the principal dimensions of the different sized mills.

Top Saw Rig is extra heavy and set in front of the mandrel so as to leave unlimited space for slabs to fall and removing all danger of boards wedging between the saw and top saw frame. The mandrel runs in self-oiling bearings which are fastened to the heavy cross bar. This cross bar is raised and lowered by a screw and hand wheel which operates both sides at one time and after it is

properly placed it is securely bolted so as to remain entirely rigid. The belt tightener for the top saw is made of steel and controlled with a lever from the sawyer's position. The top saw guide is of the same type as the lower guide and is regularly furnished.

Cut shows one half of Jaw Coupling where an extended shaft is wanted to drive the mill and other machinery. A 60" lower saw is generally used with a 34" or 36" upper saw on the No. 6 Mill, and 60" and 40" saws on the No. 7 and 8 Mills, although 66" and 40", and 72" and 36" saws can be used with the latter two sizes.



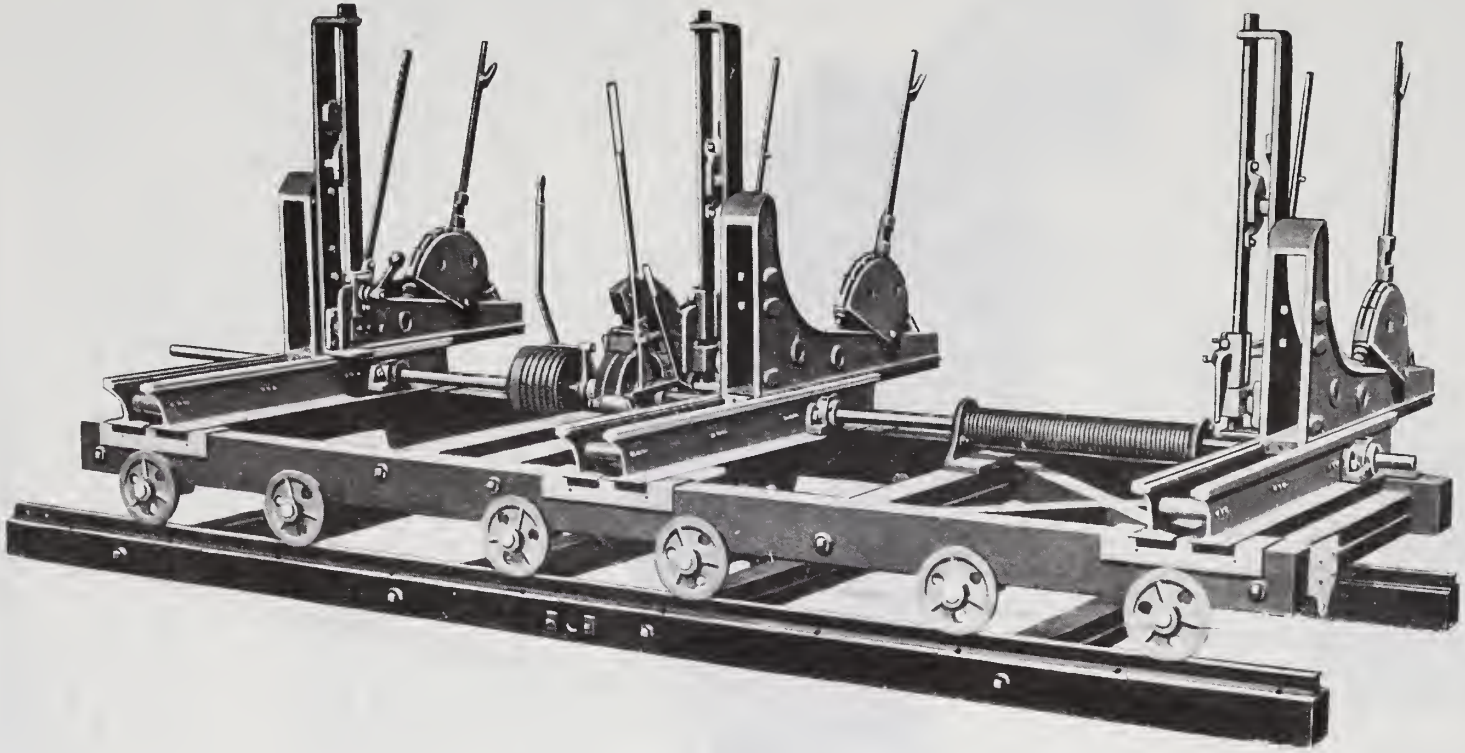
Husk of No. 6, 7 and 8 Mills with top Saw Rig.

GIANT BELT FEED

The standard feed arrangement for these heavy mills is that of the well known Giant Belt Feed, the general design of which has received the widest recognition as the best feed arrangement for heavy mills of any arrangement presented to the saw mill trade, except the steam feed. The arrangement, as will be noticed, is extremely simple, consisting of an endless belt driving two frictions from a pulley on the saw arbor, and a bull wheel that works between these frictions by an eccentric bearing operated by the sawyer. This bull wheel is operated direct on the feed shaft that drives the cable drum, and being at the extreme end of the shaft, no binding is experienced from throwing the pinion out of line when the shaft is moved, as is the result when this bull wheel is fastened too close to the pinion. This clean arrangement entirely eliminates all frictions on the arbor and the heavy intermediate friction or idler, the troubles of which are too well known to those who have used them.

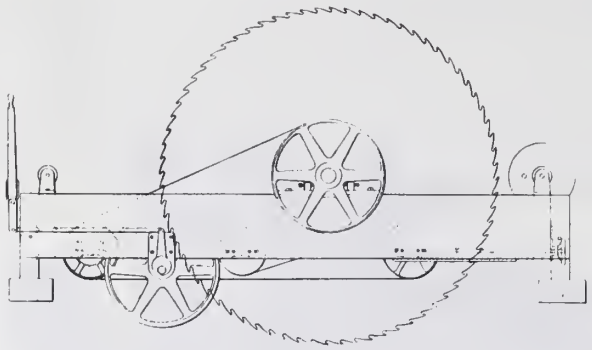
Our characteristic design in applying the above features is such as to distinguish it from others. All bearings are of a new style swivel type which allows the operator to keep all shafts in complete alignment at all times, also as these bearings are held in a swivel, they last much longer, owing to their constant true alignment. The tightener pulley is held in a heavy frame, which slides on irons placed on the bottom of the husk, the tightener frame with pulley being tightened and loosened at will by a screw and hand wheel.

HEAVY CARRIAGES

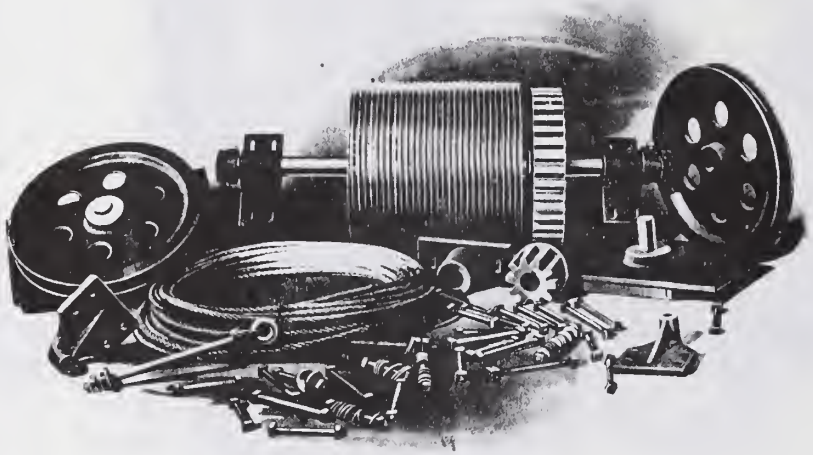


Carriage for No. 6, 7, and 8 Mills

The carriages for the Giant Mills are built in true accordance with the frame, being in every way of a solid construction. Nothing but the very best Southern Pine is used in the construction, is well braced, and held together by heavy bolts running from side to side. The axles are large with the wheels pressed on by hydraulic pressure on either end, and run in long bearings lined with the best grade of babbit, with the lower side of the bearing acting as a receptacle for oil. Lugs are also provided by which end wear can be taken up by bolts that fasten to the carriage timber.



CABLE DRIVE



The accompanying cut shows our wire rope driving arrangement, which is the ideal form of carriage drive.

We use the double cable system on all our mills which allows the carriage to be operated farther and is much more satisfactory. All drums are cast, with grooves **turned** on the face for the cable which gives more surface to the cable, and does away with the trouble of the cable flattening and shearing on the sides as a result of the rope guiding itself. The wooden drum costs much less to make for the manufacturer, but it is expensive to the operator to supply new cables.

STEAM OR SHOTGUN FEEDS

We are prepared to equip these mills with steam feeds when so desired. Our sizes are 6", 8", 9" and 10" bore, any length desired. Cuts and blue prints furnished on application.

American "Ideal" Set Works with Quick Receder

Our New Improved "Ideal" Set Works with Quick Receder is the most desirable improvement put on portable saw mills in recent years.

It is very simple and works very easily in setting or receding. Both setting and receding are done by same lever.

To recede the pull lever is twisted to the extreme right until it latches; pawls will stay in this position until released. This will allow the headblock knees to recede either by direct pressure against them (as in rolling a log on carriage) or, by a straight pull on the lever as in setting. The headblocks are thrown back about three times as rapidly as they are set forward and three or four pulls of the lever are usually sufficient to recede headblocks.

Three or four stop pins may be placed in the quadrant, as illustrated, spaced for the cuts usually desired. It is not necessary to change these pins as the stop pawl, with which this set works is provided, may be dropped against or lifted over pins by a slight right hand twist of pull lever.

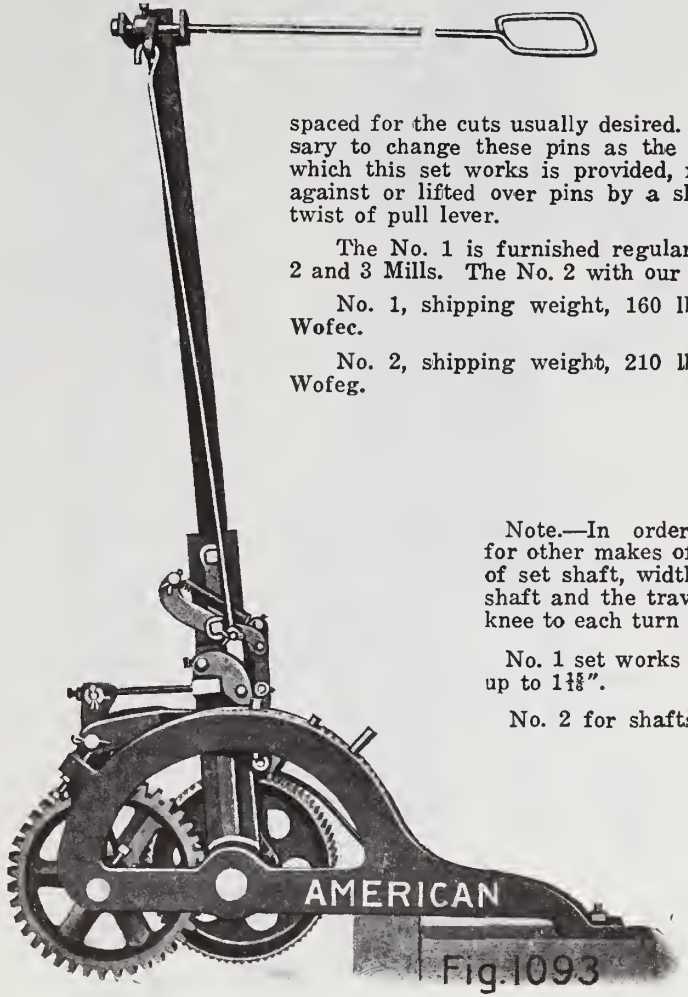


Fig. 1093

The No. 1 is furnished regularly with Nos. 1, 2 and 3 Mills. The No. 2 with our No. 4 Mill.

No. 1, shipping weight, 160 lbs. Code word, Wofec.

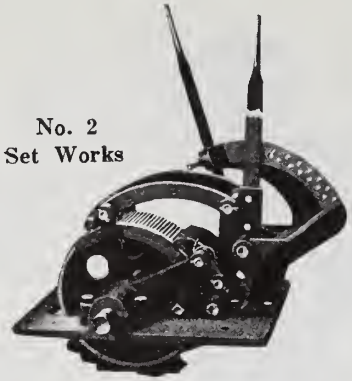
No. 2, shipping weight, 210 lbs. Code word, Wofeg.

Note.—In ordering set works for other makes of mills, give size of set shaft, width of key seat in shaft and the travel of head-block knee to each turn of set shaft.

No. 1 set works made for shafts up to $1\frac{15}{16}$".

No. 2 for shafts up to 2¼".

American Double Acting Set Works


No. 2
Set Works

Nos. 1 and 2 have ratchet wheels with cut teeth and cast steel pawls carefully ground to insure accurate setting. **Steel Ratchet Wheels** furnished at extra price. The quadrant is graduated by 8ths or 16ths, and fitted with adjustable stop and an adjusting screw to provide for setting scant or full.

No. 1 Set Works is not illustrated. It is in principle the same as No. 2, but differs somewhat in construction.

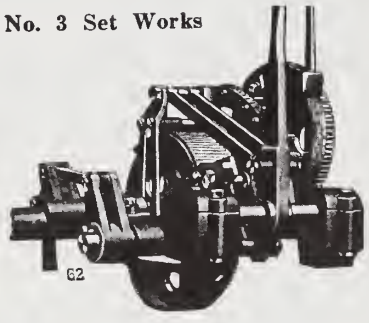
Size	No. 1	No. 1½	No. 2	No. 3
Weight complete	200 lbs.	350 lbs.	500 lbs.	536 lbs.
Size of Ratchet Wheel	12"x3"	12"x3"	18"x5"	18"x4"
Largest Set Shaft that can be used	2¼"	2¼"	2¾"	3"
Will set with double throw of lever	2½"	2¼"	2½"	2$\frac{13}{16}$"
Can be used on our Mills Nos.	3 to 6	6½	7½	7½ and 8
Code Word	Wofes	Wofew	Woffi	Woffy

Spring or Power Receder must be used with these set works.

No. 1½
Set Works

No. 1½ Steel Set Works—All small parts are made of steel. Spring or power receder may be used. Indicator dial as shown is not part of the regular set works, but is furnished, when ordered, at extra cost. This set works is used regularly with No. 6½ Saw Mill.

No. 3 Set Works



The No. 3 Set Works is constructed of STEEL. The quadrant is carried by one of the yokes and the location of the stop pins in this quadrant determines the travel of the knee. They may be set so that one throw of the set lever moves the knee 1-32" or a double throw 1-16". The receding lever lifts the pawls first, then applies the power receder so that the pawls cannot be down when the receder or brake is applied.

Condensed Specifications of Portable Saw Mills

	Variable Friction Feed Saw Mills			Variable Belt Feed Saw Mills				Hercules Feed Saw Mills			
Size of Mill	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3	No. 4	No. 4	No. 6	No. 6½	No. 7½
Size of Husk Frame	7′x3′	7½′x3½′	8′x4′	7′x3′	8′x3½′	8½′x4′	8½′x4′	9½′x4′	9½′x4½′	9½′x4½′	10½′x5′
Size of Husk Timbers	3½″x9½″	3½″x9½″	4½″x11½″	3½″x9½″	3½″x9½″	4½″x11½″	4½″x11½″	4½″x11½″	4½″x11½″	5½″x11½″	5½″x11½″
Mandrel, Dia. and Length	2 3/16″x58″	2 7/16″x66″	2 7/16″x72″	2 3/16″x58″	2 7/16″x66″	2 7/16″x72″	2 15/16″x72″	2 15/16″x72″	2 15/16″x10′	2 15/16″x10′	3 7/16″x10′
Mandrel Pulley	20″x8″	20″x10″	20″x12″	20″x8″	20″x10″	20″x12″	24″x12″	24″x12″	24″x12″	24″x12″	24″x14″
Width of Feed Belts				4″	4″	6″	6″	6″	6″	8″	10″
Length of Carriage	16′	20′	20′	16′	20′	20′	20′	20′	20′	20′	20′
Width of Carriage	30″	30″	36″	30″	30″	36″	40″	40″	40″	48″	59″
Size Carriage Timbers	3½″x5½″	3½″x5½″	4½″x5½″	3½″x5½″	3½″x5½″	4½″x5½″	5½″x5½″	5½″x5½″	5½″x5½″	5½″x5½″	5½″x7½″
Number of Trucks	4	6	6	4	6	6	6	6	6	6	6
Size of Truck Wheels	7″	7″	8″	7″	7″	8″	10″	10″	10″	10″	12″
Diameter Truck Axles	1¼″	1 1/4″	1½″	1¼″	1¼″	1½″	1 15/16″	1 15/16″	1 15/16″	1 15/16″	1 15/16″
Length of Set Shaft	16′	20′	20′	16′	20′	20′	20′	20′	20′	20′	20′
Diameter of Set Shaft	1 7/16″	1 15/16″	1 15/16″	1 7/16″	1 15/16″	1 15/16″	1 15/16″	1 15/16″	1 15/16″	2 3/16″	2 3/16″
Number of Head-Blocks and Dogs	2	2	2	2	2	2	2	2	2	3	3
Head-Blocks open from saw	38″	38″	44″	38″	38″	44″	48″	48″	48″	38″	46″
Length of Track and Ways	48′	56′	56′	48′	56′	56′	56′	56′	56′	56′	60′

American Variable Friction Feed

The American Variable Friction Feed can be attached to almost any make of portable mill. There are no complicated parts to wear out or to give trouble. A complete feed consists of the two sets of frictions, with the necessary shafts, boxes, collars, sawyer's lever and attachments, also the feed pinion and a large feed gear of a size suitable for the mill to which the feed is to be attached. Shafts are furnished of required length, according to order. Feeds are made in three standard sizes, suitable for mills using 10 to 40 H. P.

When ordering, give the following measurements:

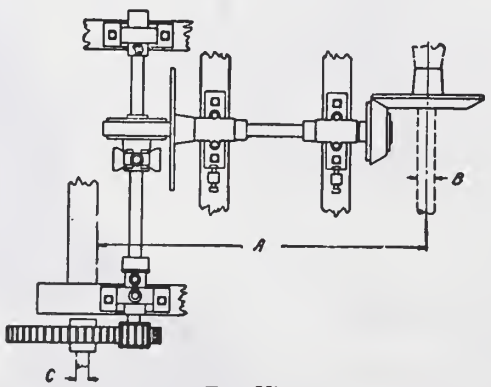
A. Distance from inside front end of husk frame to center of mandrel.

B. Exact diameter of mandrel.

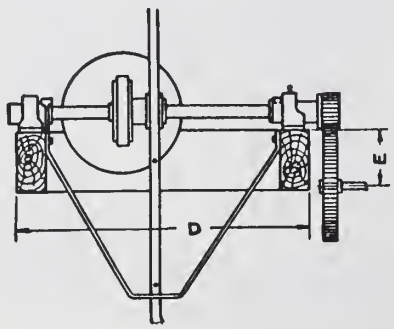
C. Exact diameter of drum pinion shaft.

D. Outside width of husk frame.

E. Distance from top of husk frame to center of drum pinion shaft.



Top View

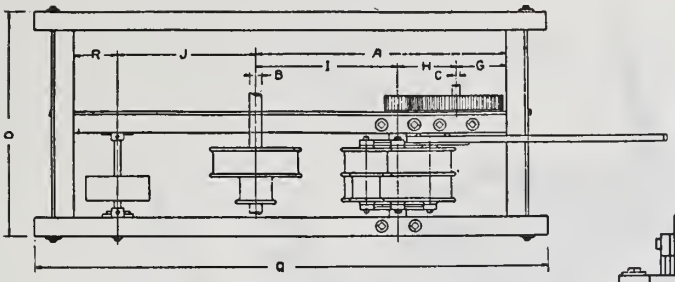


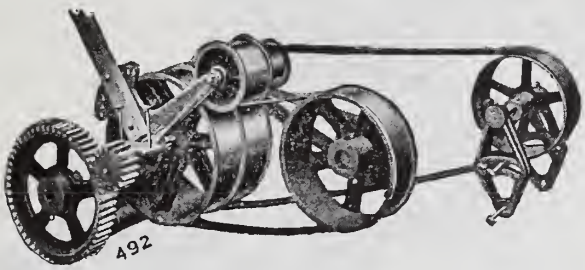
End View

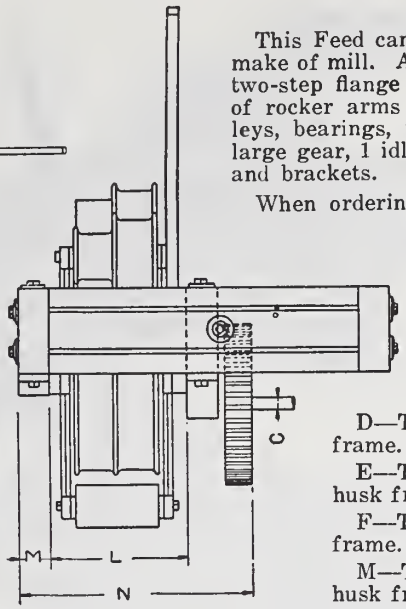
Size		Shipping Weight
No. 1, same as used on No. 1 Mill*	Code Word, Woela	300 lbs.
No. 2, same as used on No. 2 Mill	Code Word, Woelb	425 lbs.
No. 3, same as used on No. 3 Mill	Code Word, Woelf	460 lbs.

*No. 1 feed has flat face friction instead of bevel.

American "Heacock" Variable Belt Feed







This Feed can be attached to almost any make of mill. A complete feed consists of a two-step flange pulley for mandrel; 1 pair of rocker arms complete with shafts, pulleys, bearings, weight, lever and pinion; 1 large gear, 1 idler pulley with shaft, collars and brackets.

When ordering give the following measurements:

A—Distance from inside front end of husk frame to center of mandrel.

B—Diameter of mandrel.

C—Diameter of rack pinion shaft.

D—The outside width of husk frame.

E—The distance from top of husk frame to center of rack shaft.

F—The width of sides of husk frame.

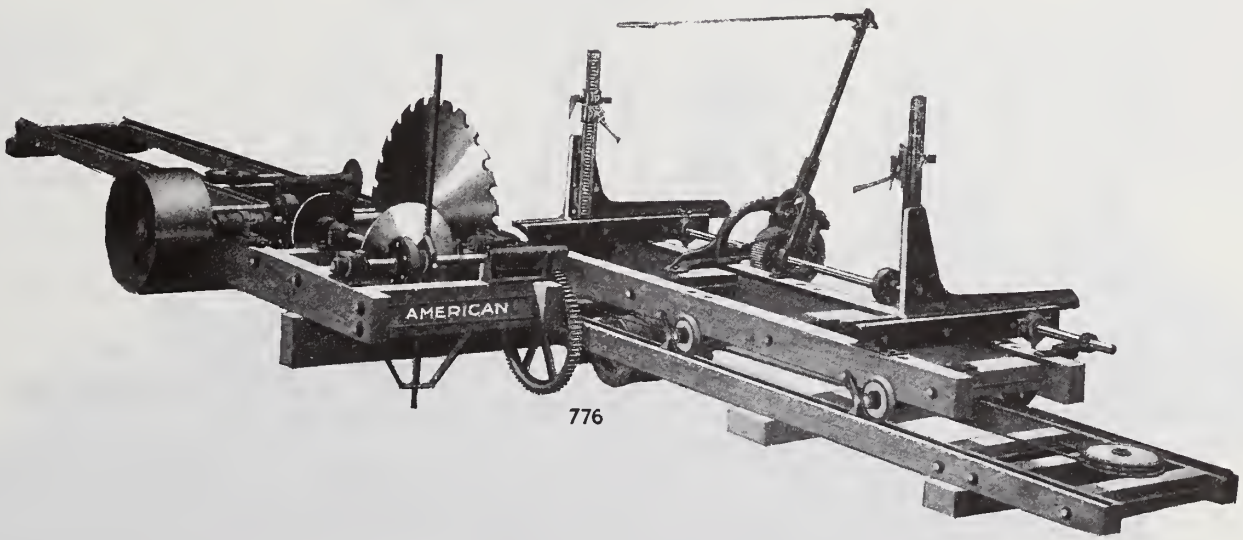
M—The thickness of sides of husk frame.

Is your carriage driven by wire cable?

State make of your saw mill.

Feeds are made in three sizes, as follows:

	Domestic Shipping Weight	Export Weight	Cubic Feet	Code Word
4″ Belt No. 1	510 lbs.	510 lbs.	10	Woeki
4″ Belt No. 2	710 lbs.	710 lbs.	13	Woeks
6″ Belt No. 3	1100 lbs.	1100 lbs.	16½	Woeky

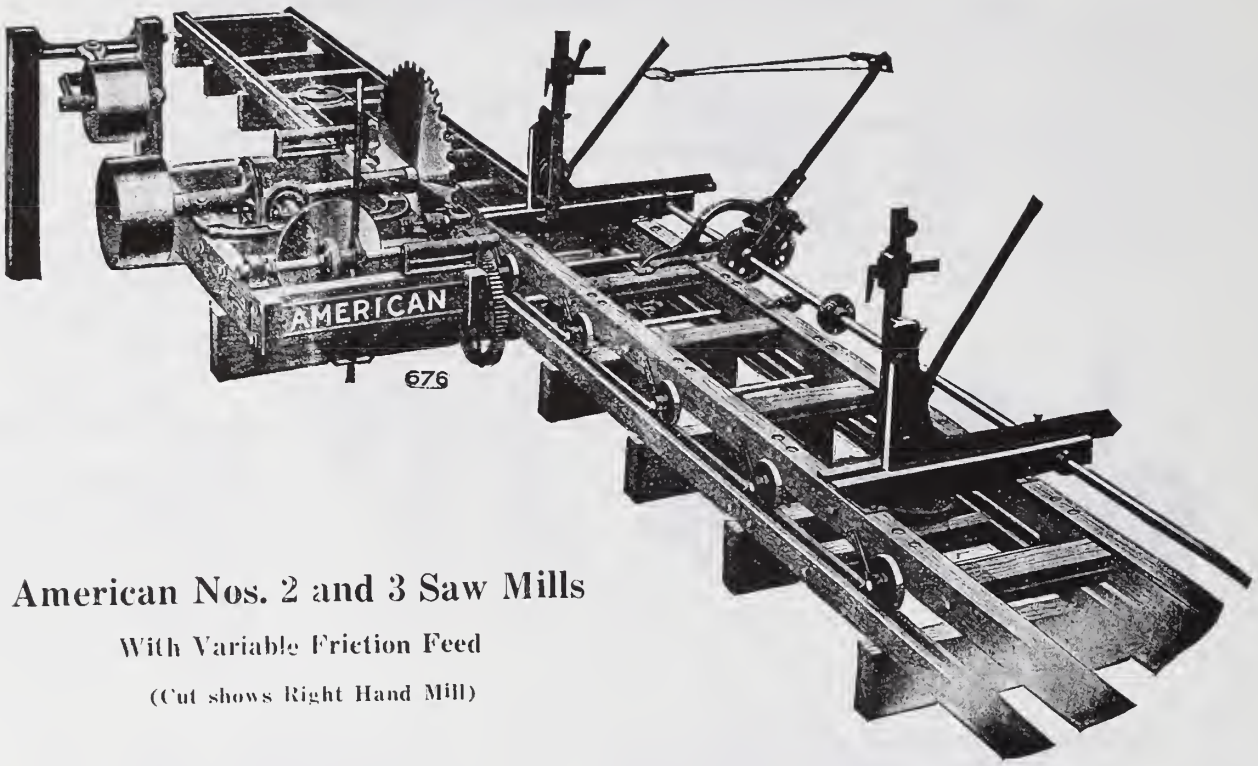


American No. 1 Saw Mill

With Variable Friction Feed

Right Hand Mill—Code Word, Woedu

No. 1 Mill regularly equipped with Ever Ready Dogs shown on page 48.



American Nos. 2 and 3 Saw Mills

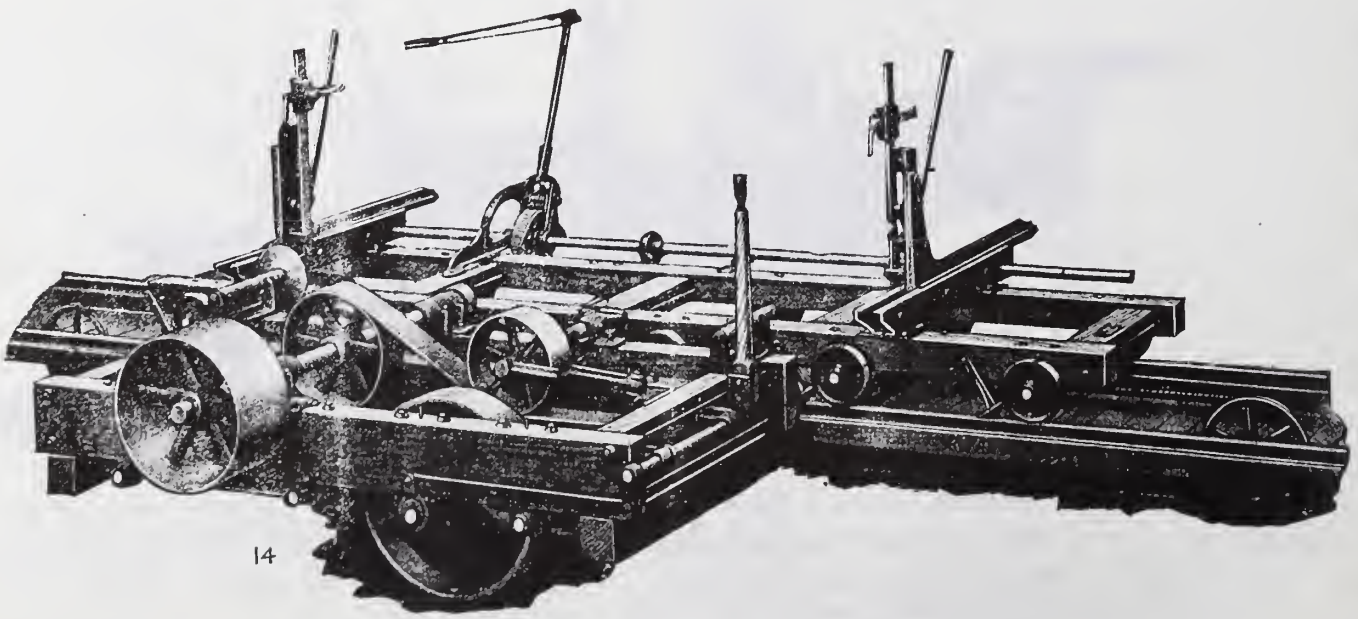
With Variable Friction Feed

(Cut shows Right Hand Mill)

American No. 4 Saw Mill

With "Hercules" Feed

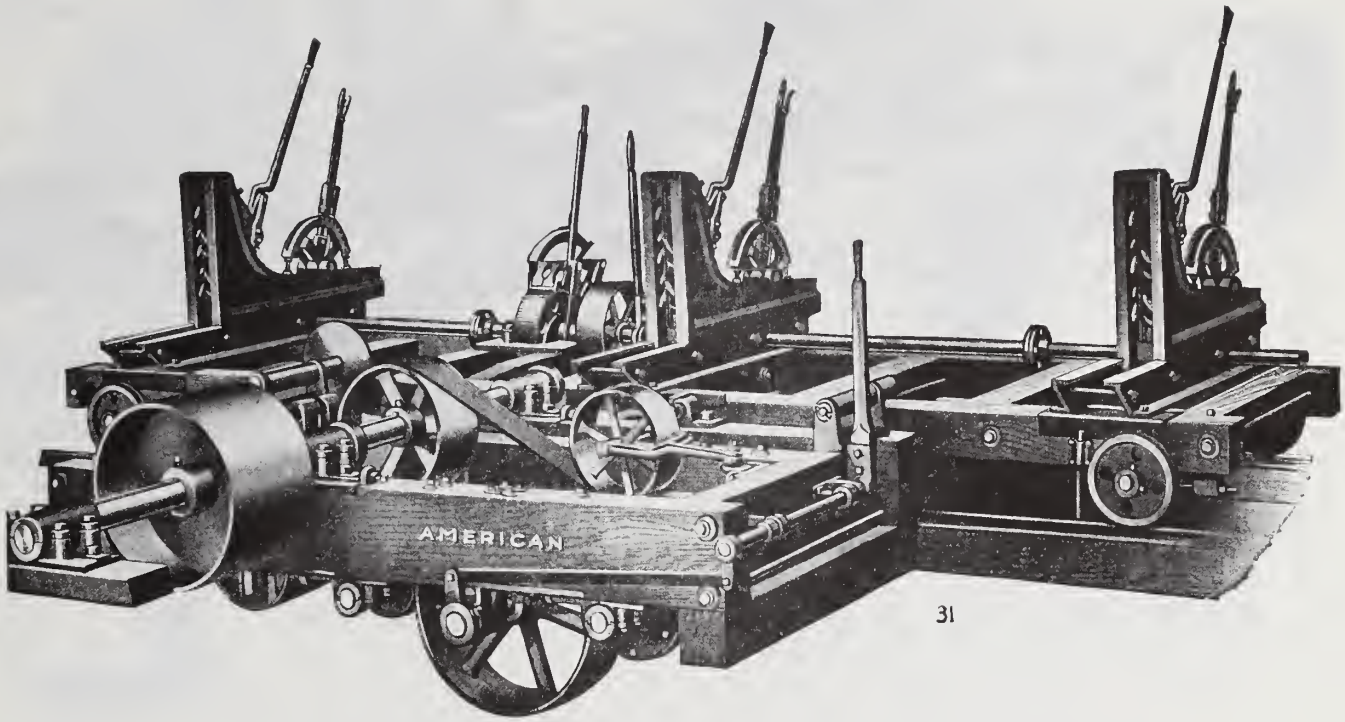
Code Word, Woefy



The Only Absolutely Reliable Combined Belt and Friction Feed

American No. 7½ Saw Mill

With "Hercules" Feed

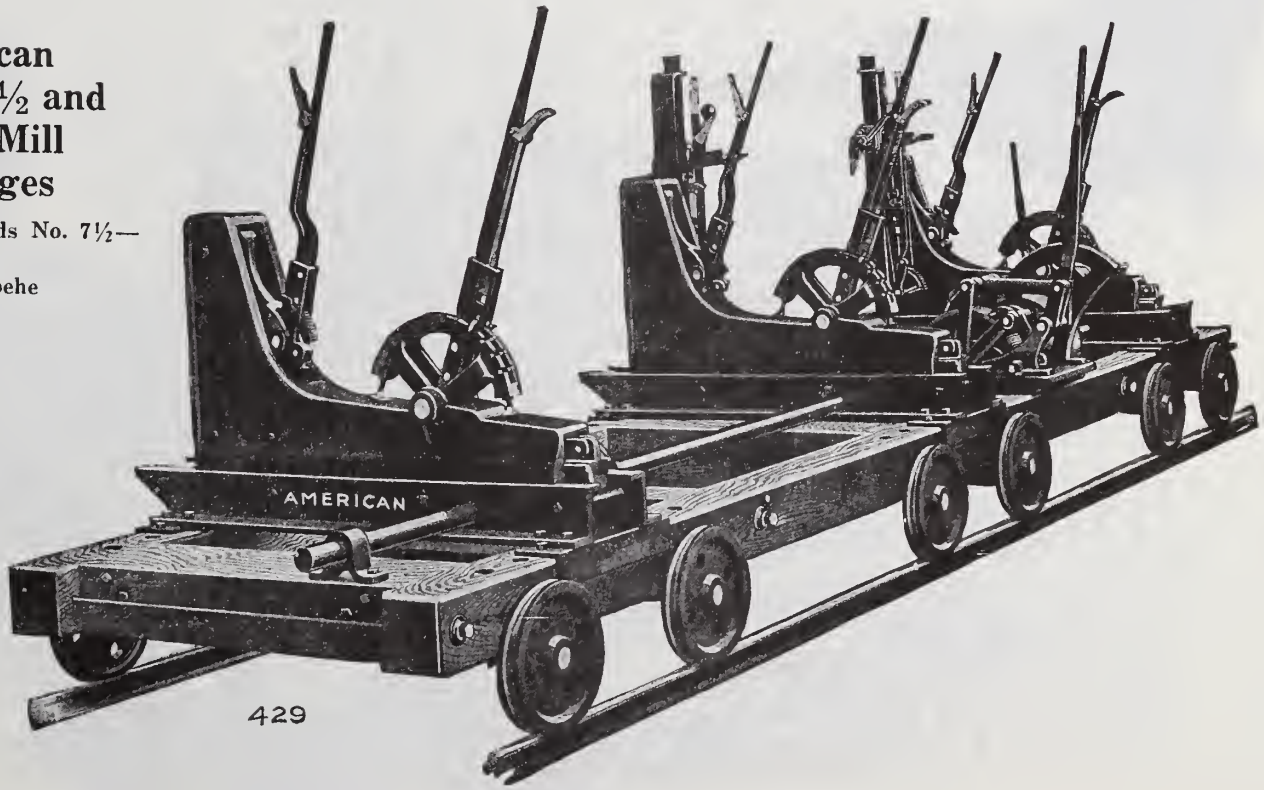


31

American Nos. 7½ and 8 Saw Mill Carriages

Code Words No. 7½—Woegn

No. 8—Woehe



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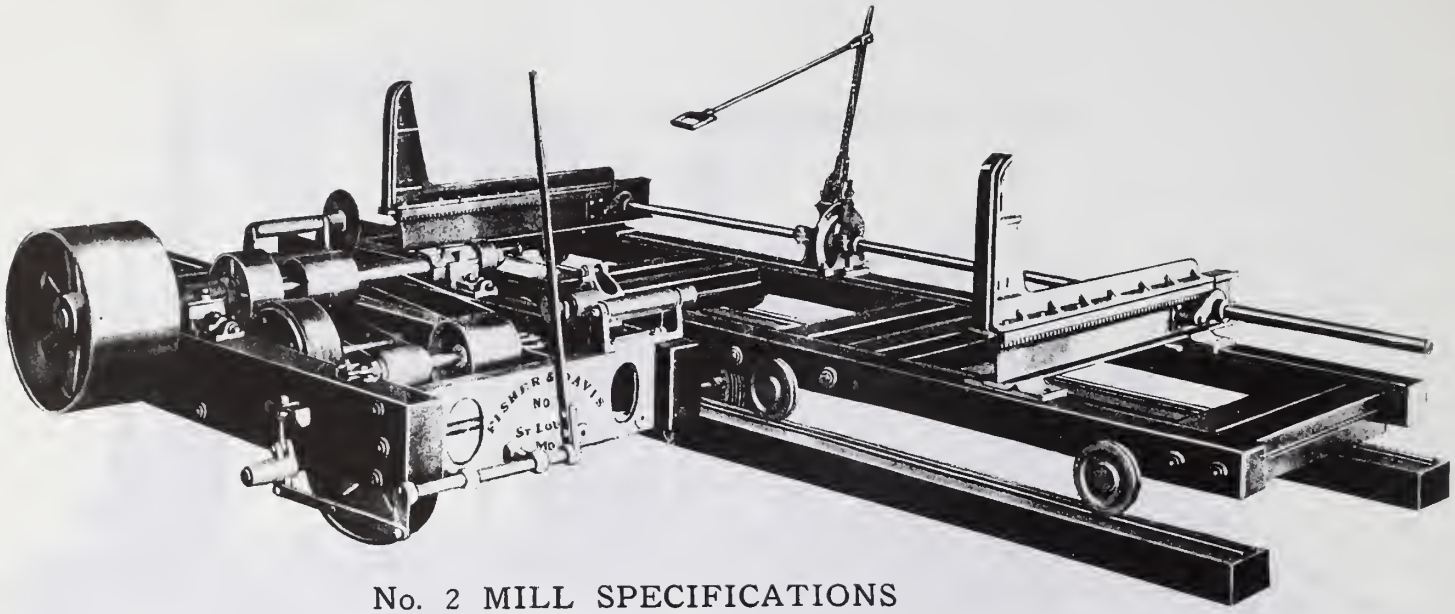
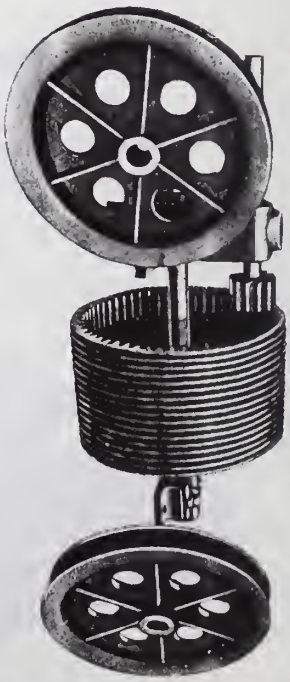


No. 2 MILL SPECIFICATIONS

Husk dimensions	4' 2" x 8'
Husk timbers	6" x 12"
Saw mandrel	2⅞" x 72"
Drive pulley	24" x 12"
Face of frictions	5"
Width of feed belt	8"

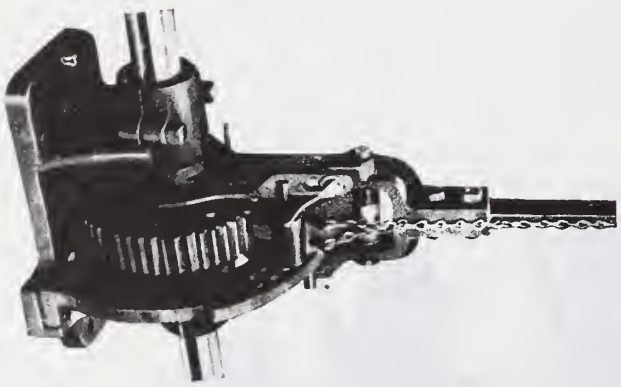
Size of saw	60" or less
Carriage length	12, 14, 16, 20 or 24 ft.
Carriage timbers	6" x 6"
Carriage trucks	$1\frac{7}{16}$" axle and 8" wheels
Opening of headblocks	44"
Set works, No. 2, single acting.	



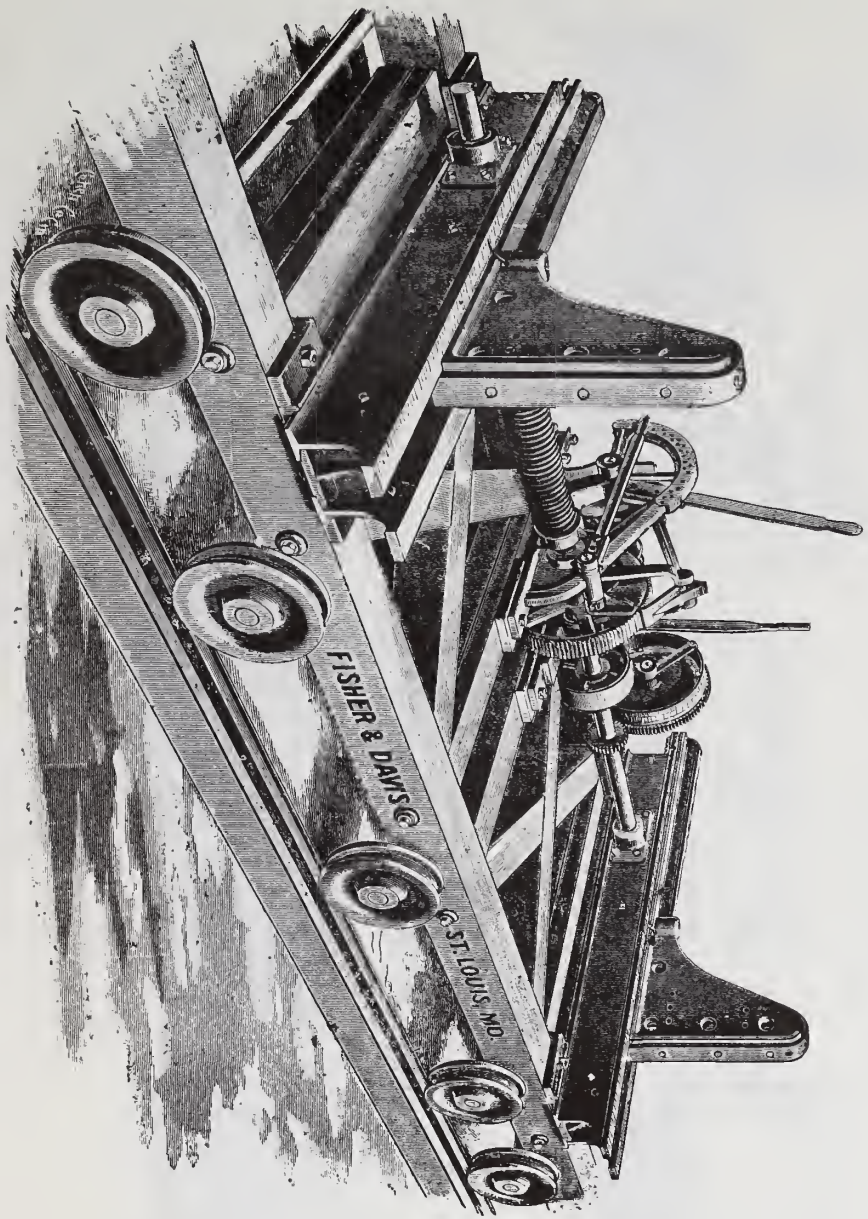
The ends and the center of the carriage is double braced for Wire Rope feed. The axles are $1\frac{7}{16}$ inch diameter steel fitted with 8-inch groove and flat wheels, and running in self-oiling babbitted boxes. Wrought iron tee and flat track, drilled, of suitable length, is furnished with the mill.

No. 2 Wire Rope Feed is regularly furnished with this mill. The 20-inch iron drum is turned and grooved to fit wire rope and keyed to the drum shaft. The drive pinion is 1 inch pitch and shrouded on one side, making it practically unbreakable. The drum shaft bearing and the double bearing are lined with a good quality of babbitt metal. Two 16-inch sheaves with boxes and shafts, and two eye bolts for attaching wire rope to the carriage are furnished.

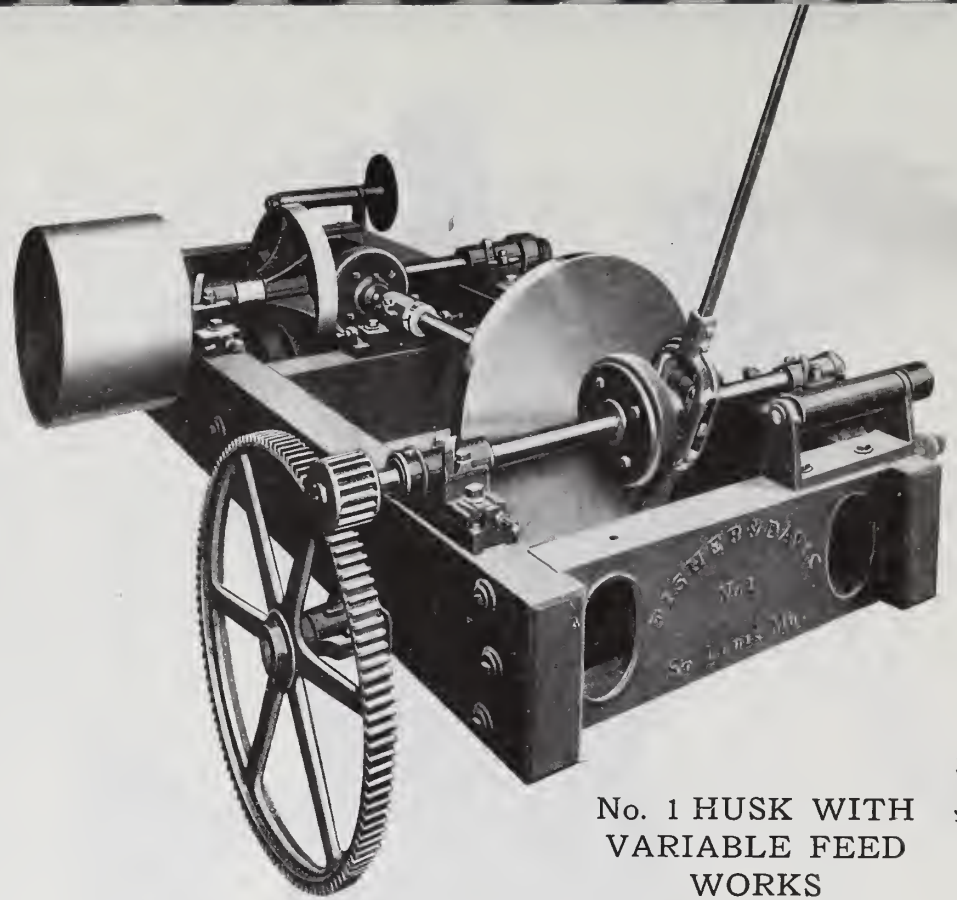
No. 2½ Head Blocks, which are fully described on page 13, are furnished with this mill.



Set Works for the Regular No. 2 Mill are Independent and Single Acting, setting by eighths of an inch. They can be fastened to any point on the carriage, and are arranged with a cross lever so that the Sawyer can set knees either forward or backward without changing his position. The Ratchet Wheel is cut from solid metal, and the pawls, two in number, are tempered steel. The yoke and also lifting device for raising pawls, is made of malleable iron.



Carriage with No. 4 Blocks



No. 1 HUSK WITH VARIABLE FEED WORKS

This has been found by experience to be the best for average conditions of sawing. However, it can be changed to whatever the customer desires without extra charge.

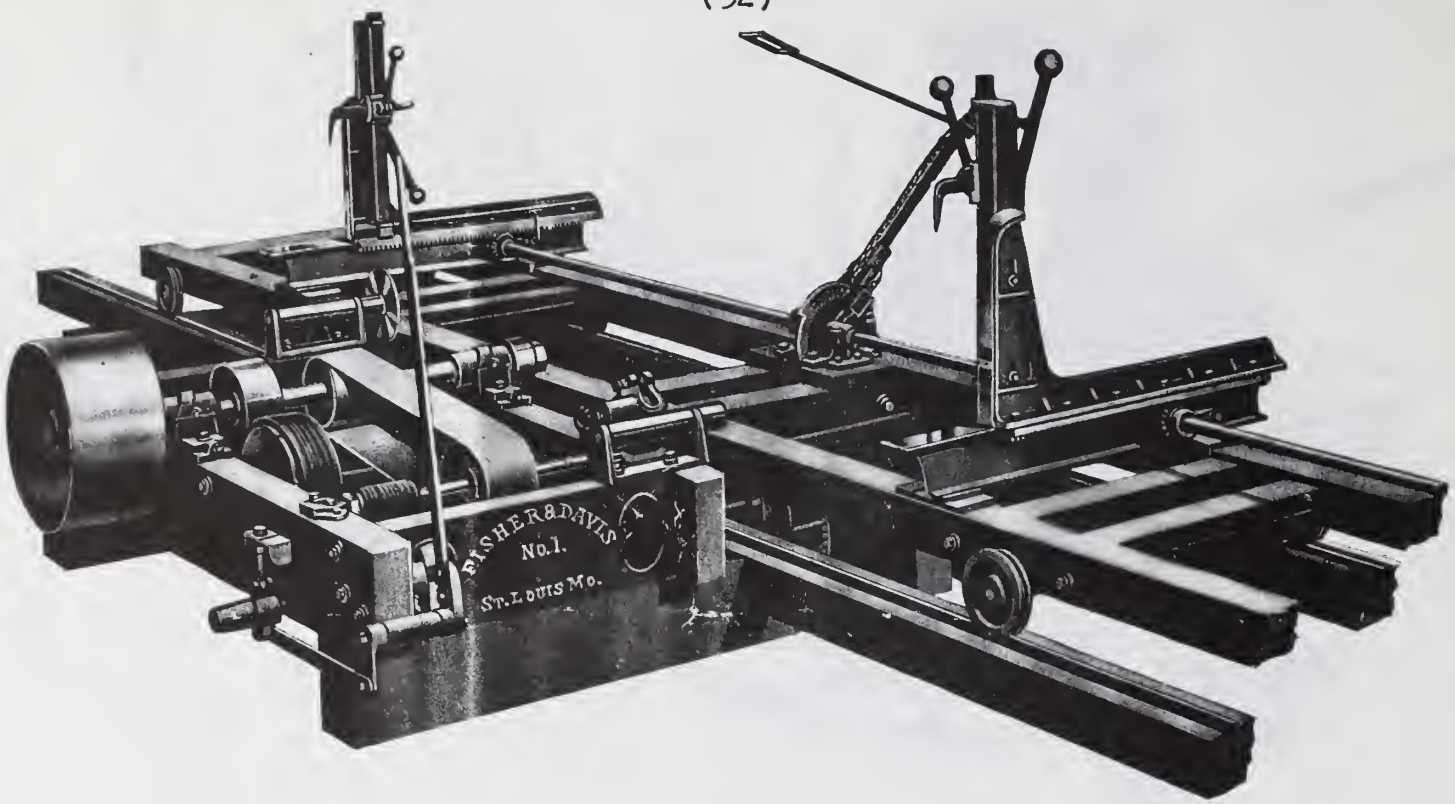
The Saw Guide is of a new pattern made adjustable in all directions without danger to the operator. The fork can be thrown back to allow changing the saws.

The Drive Pulley is regularly 20″x10″ double belt cast iron, turned and balanced. This size, however, can be changed without extra charge.

The Splitter Wheel and **Rolls** are turned and polished and revolve on turned steel shafts.

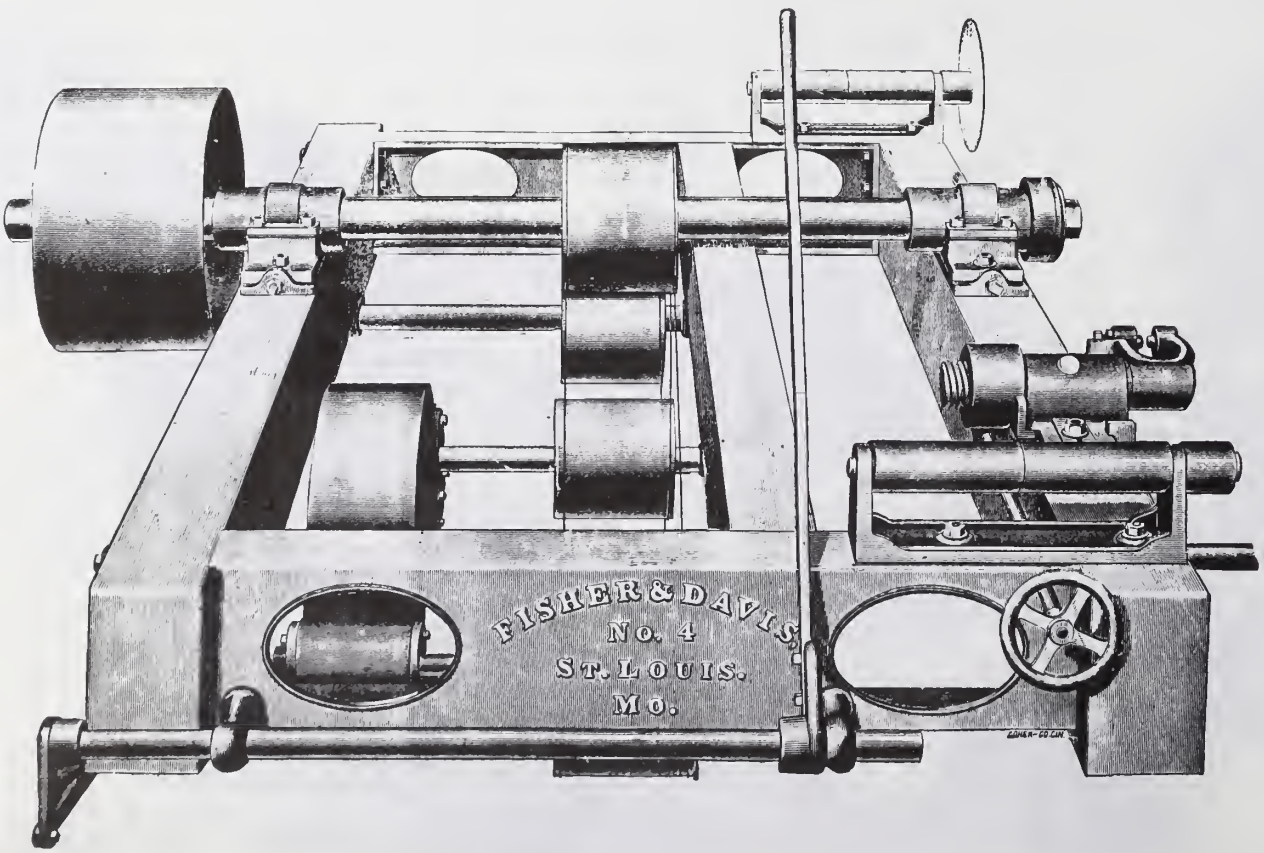
The Carriage is usually made 20 feet long, in two equal sections, of 5″x5″ seasoned long leaf yellow pine, mortised, tenoned, and bolted together by bolts extending across the carriage. If rack and pinion feed is used, the rack stick is 24 feet long. When the wire rope feed is used, the ends of the carriage are double braced and an extra cross piece put in the center of each section.

The VARIABLE FEED WORKS can be substituted for the standard feed works by those preferring this type, with a slight increase in price.

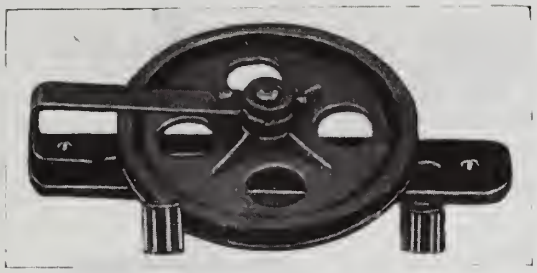


No. 1 MILL SPECIFICATIONS

Husk dimensions	3'-10"x8'
Husk timbers	5"x12"
Saw mandrel	2 7/16"x60"
Drive pulley	20"x10"
Face of frictions	4"
Width of feed belt	6"
Standard feed and gig	2¾" and 8"
Size of saw recommended	56"
Carriage length	12, 14, 16, 20 and 24 feet
Carriage timbers	5"x5"
Carriage track, length	36, 42, 48 and 56 feet
Carriage trucks	1 3/16" axles, 8" wheels
Opening of headblocks	36"
Set works, No. 1, single acting.	



No. 4 Mill Giant Feed Works

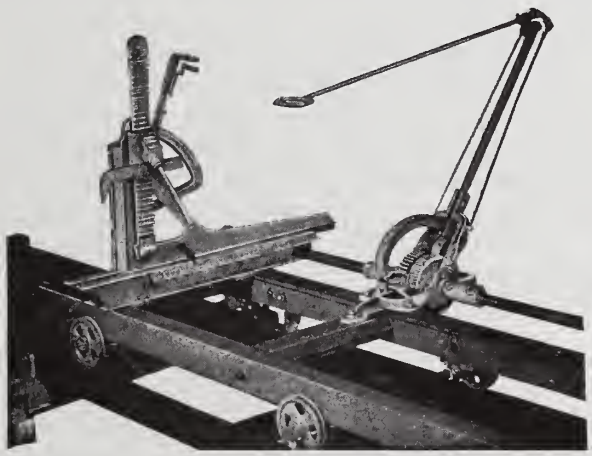


Shieve Wheels with Roller Bearings

Worn bearings in the Shieve Wheel, which often cause the cable to jump off the wheel, are a source of expense and delay. Our Rope Drive Feed with Roller Bearings is a remedy for this annoyance. A guard is used so that if the cable should come off, it cannot be thrown over and damage the saw.

Feed Works with Heacock Slit Belt Drive

The most satisfactory Feed that has ever been used on saw mills is the **Heacock Slit Belt** type, which allows the sawer to engage his feed from ½" to 4" to the revolutions of the saw. Our Roller Bearings on these Feed Works have a hard outer race, running against especially hard steel shafts. Their speed is normal and this makes an excellent frictionless bearing.



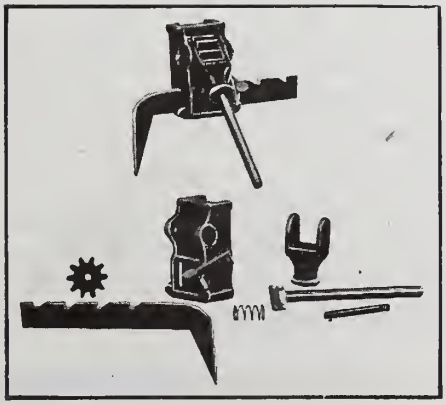
Set Works for Quick Receding

Fast and Accurate Sawing

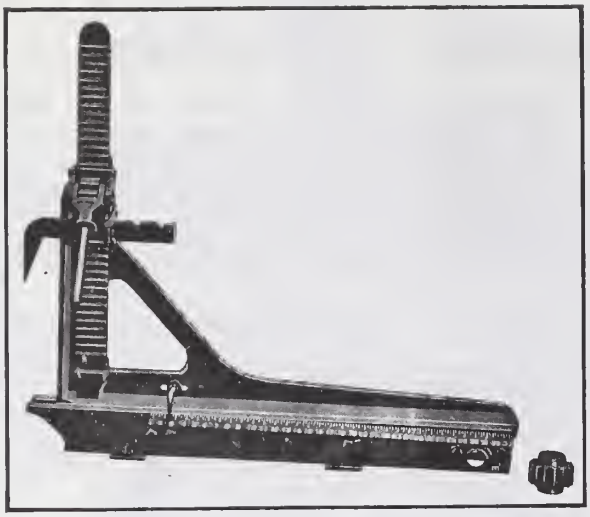
Of paramount importance to fast and accurate sawing is the Set Works and Head-Block assembly here shown. This design is a TURNER development of the fractional set and fast receding type which makes the use of a power receder unnecessary.

With the TURNER construction you can cut lumber 1-1/16" thick. The graduations are made in 16's. By simply twisting the operating lever of the Set Works, you are able to recede the Headblock three times as fast as they are advanced forward. In other words two or three strokes will throw the Headblock back to receive the log.

The Dog Assembly is of most recent date and advanced design—essentially a one-hand dog, it is from one to three pounds lighter and vastly stronger than any used heretofore.



« Dog Assembly



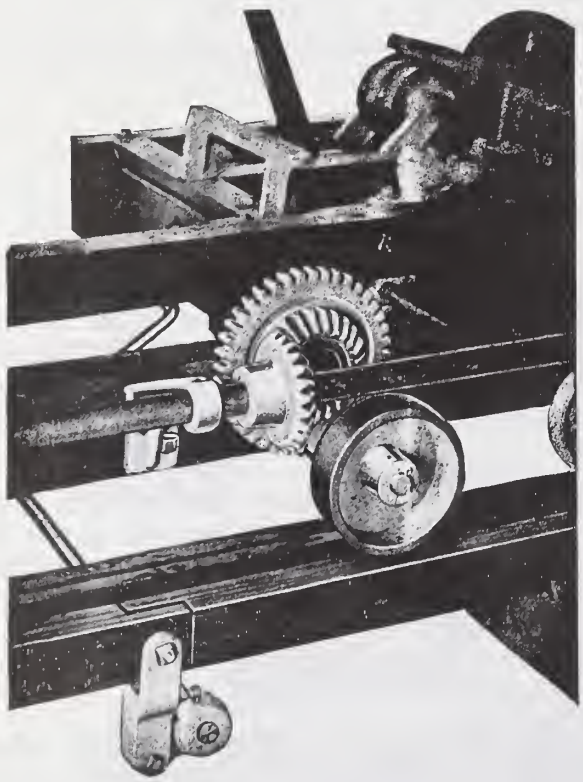
The Headblock shown although of the conventional type has many refinements not used in other mills. Alloys are used in its makeup and its base is from closely machined steel I beams.

TAPER ATTACHMENT
Right

The Taper, or Set Out Knee, shown opposite, is not standard equipment on the TURNER mill. However its extremely low cost and the great convenience it affords should make it a part of every order.

HEADBLOCK
Shown at Left.

TURNER'S POWER RECEDER



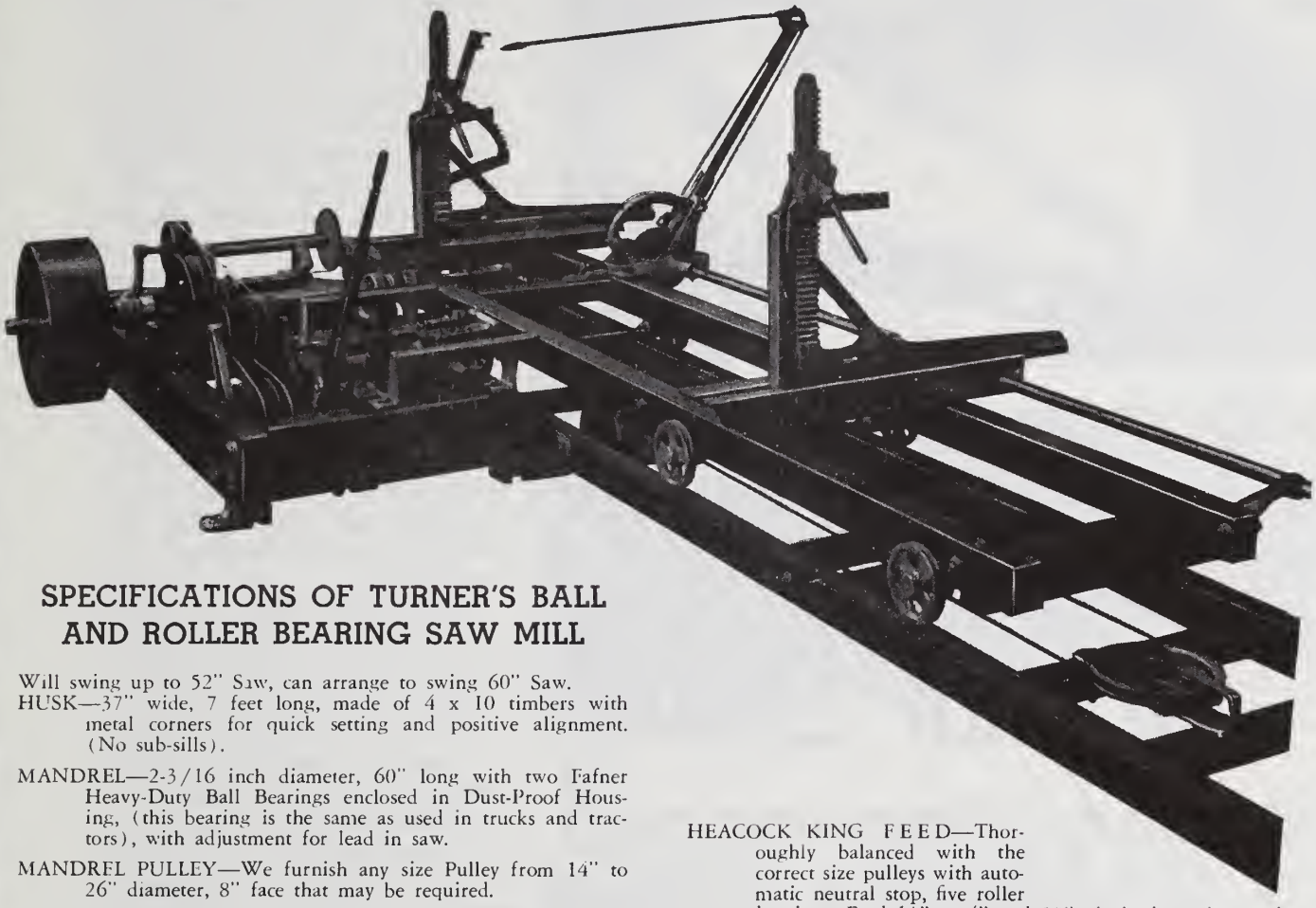
This attachment very materially facilitates the handling of the head blocks, thereby increasing the capacity of your mill. It is not an attachment that is absolutely necessary to the good operator of the saw mill, but a number of good saw mill operators save considerable time and increase their output with the TURNER MILL and tractor, when using this attachment, because it allows for the receding of the head blocks while the carriage is coming back after the last plank or board has been removed; so that when the carriage arrives at the log way, the head blocks are back and ready to receive the log.

With the new quick receding set works with which the Turner Mill is equipped, this power receding attachment is not needed so badly as when other set works are used which do not have the quick receding features, but the power receder can be attached to the Turner Saw Mill in connection with the quick receding set works, and the mill is bored to receive this attachment, which can be had when the mill is bought new, or can be put on at any future time.

If the operator is desirous of getting full capacity from the mill and is quick and handy with his operations this power receder will easily pay for itself in a short time. It is very simple and effective and works with ease. This Power Receder attachment is not furnished regular with the Turner Mill, but when ordered will be charged for extra.

Turner's New BALL AND ROLLER BEARINGS Pony Saw Mill

A full grown and husky Saw Mill capable of cutting a thousand feet or more of lumber per hour—operates economically on any available power from 10 to 75 H. P. The price is low enough for home use—it is built strong enough for custom use. It has the most modern innovation of frictionless operation used in automobile construction.



SPECIFICATIONS OF TURNER'S BALL AND ROLLER BEARING SAW MILL

Will swing up to 52" Saw, can arrange to swing 60" Saw.

HUSK—37" wide, 7 feet long, made of 4 x 10 timbers with metal corners for quick setting and positive alignment. (No sub-sills).

MANDREL—2-3/16 inch diameter, 60" long with two Fafner Heavy-Duty Ball Bearings enclosed in Dust-Proof Housing, (this bearing is the same as used in trucks and tractors), with adjustment for lead in saw.

MANDREL PULLEY—We furnish any size Pulley from 14" to 26" diameter, 8" face that may be required.

CARRIAGE—May be had in lengths of 10 foot, 14 foot, 16 foot and 20 foot. 30½" wide, made of timber 3½ x 4½ inch; 3 to 6 sets of 7" wheels and axles with 2 roller bearings on each axle, dust-proof. The number of axles furnished depends upon the length of the carriage.

WAYS—Are three times the length of the carriage furnished. The V or U Steel Track is placed next to the Saw, flat track is on the outside.

CABLE DRIVE—Complete in all its details with 2 shieve wheels running on perpendicular shaft with roller bearings.

HEADBLOCKS—Made of 4" eye beam accurately machined. Cast iron knee which opens 33" and will take 36" log.

DOG—New and improved type dog with malleable iron crosshead, light and one-hand operated.

SET WORKS—Fractional set works which graduate to 1/16 with quick receding attachment, a compact part of the set works and handles with the same lever which will recede the headblocks three times as fast as they are set up.

HEACOCK KING FEED—Thoroughly balanced with the correct size pulleys with automatic neutral stop, five roller bearings. Feed ½" to 4" and 10" gig back to the revolution of the Saw.

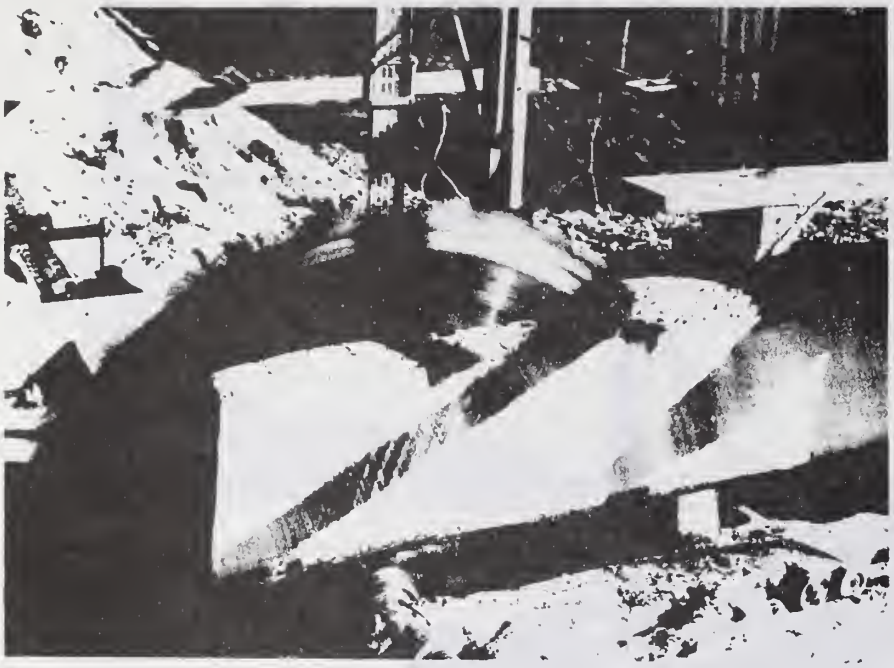
CAPACITY—3,000 to 10,000 feet accurately manufactured lumber per day, depending upon the power, operator and class of timber sawed.

WEIGHT—Approximately 3,000 lbs.

The following are included with the Mill as regular equipment. Belts for feed works, one cant hook, one monkey wrench, one oil can, one wrench for saw mandrel, one book of instructions and repair parts list.

There are a number of extras that may be added, such as a third headblock, power receder, taper attachment, dust elevator, etc. These are not a part of the regular equipment and will be charged for extra.

THE SPECIFICATIONS FOR TURNER'S PLAIN BEARING SAW MILL ARE SAME AS ABOVE EXCEPT PLAIN BEARINGS ARE SUBSTITUTED FOR BALL AND ROLLER BEARINGS, WOOD SUB-SILLS IN PLACE OF METAL CORNERS; 4" CHANNEL IRON FOR HEADBLOCKS IN PLACE OF MACHINE EYE BEAM.



Steam Power & the Circular Saw

by Joe Park
R. #1
Princeton, Wisconsin 54968

PART I

(Text footnotes appear at the conclusion of Part II.)

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From the time of the first English settlements on our Eastern shores, there was a demand for lumber both here and abroad. England needed lumber, especially timbers for her sailing ships, and she expected the colonists to supply it. To achieve this she set the mark of the "Board Arrow" on some of the trees to designate them for use by the Royal Navy. As might be expected, the colonists defied the King of England and cut many of the marked trees for their own purposes. They justified their actions on the ancient grounds of making a livelihood.[1]

When the Revolutionary War terminated shipments from the colonies, the English turned to Canada. Isaac Stephenson described how hewn timbers called tons (twelve inches square and forty feet long) were put aboard ships and sent to England, Ireland and Scotland where they were sawed by hand.[2]

The production of lumber required saws, consequently they were among the first tools to reach this continent. The saw has been in use for centuries but its origins have been lost to history. The Greeks circulated a story that Talus used "the jawbone of a snake to cut through a piece of wood, and then formed an instrument of iron like it." But this was indeed only a story for the saw was used in Egypt before it was in Greece.

The history of the sawmill likewise is obscure. It has been claimed that a mill was in operation in Paris in the 13th century. One was said to have been driven by water power at Augsburg as early as 1322. Sawmills were in use in Norway by 1530 and in Rome by 1555. The attempt to introduce them into England was violently opposed by men who feared for their jobs.[3]

The first colonial sawmills, if they can be called that, probably were mere sheds in which manpower was used to saw lumber. A log was placed over a pit. The top sawyer stood on the log while the pitman worked from below. Together they operated the hand-powered pit or whip saw. Sometimes logs were placed on trestles and sawed in essentially the same manner.

Saws differed somewhat. Some had a tapered blade equipped with a handle on one end and a thong on the other. Some, called frame saws, had a blade mounted in the middle of a rectangular frame and were operated by grasping the frame.

Pit sawing was difficult and dirty work. Water power, abundant on the East Coast, was immediately harnessed to sawmills. Holbrook asserts that, "The genesis of the lumber industry in North America was a water driven sawmill on the Salmon Falls River in South Berwick Township near the New Hampshire border. The time was 1631." Other early mills were built in Massachusetts in 1633, in Connecticut around 1655 and in New Jersey, at Elizabethtown, in 1666.

Usually a flutter wheel (an undershot wheel) was used to power a saw or a set of saws fixed within a frame and "activated by a wooden crank on the end of a wooden axle." The saw blades were about eight feet long, eight inches wide and cut only on the down stroke at the rate of about 120

strokes per minute.

By 1825 the mechanics of a water powered sawmill were thought to be quite satisfactory if the saw was drawn up and down at a regular pace; if the log advanced uniformly to receive the stroke of the saw; and if, when the saw cut through the log the machine would stop automatically.[4]

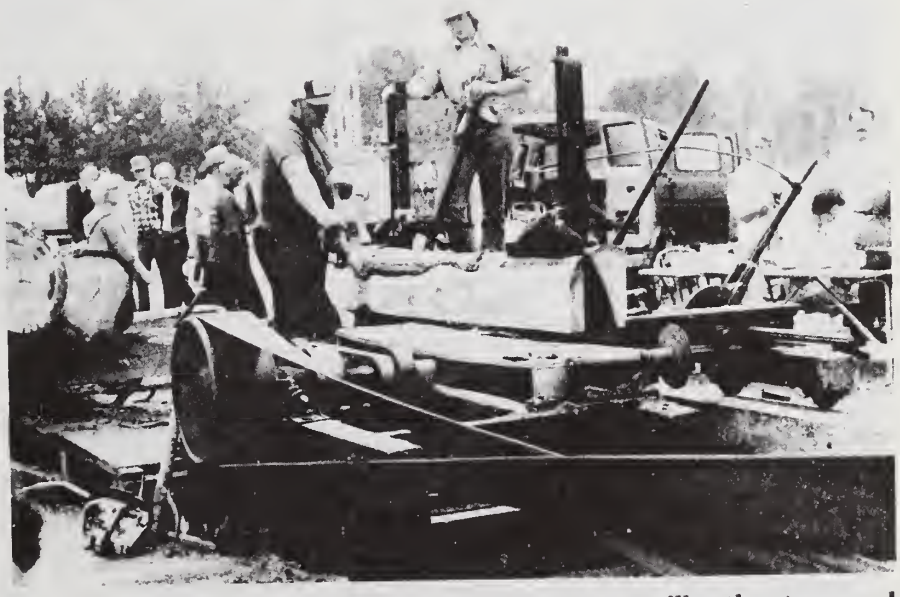
Water power had its limits. Mills had to be located at stream side. They could not be operated if the flow of the stream was inadequate for some reason or a raging torrent at flood stage. A more mobile and dependable source of power was needed; and it came into being late in the 18th century and early 19th century in the form of the steam engine.

Steam engines were used in British mines in the days of James Watt and soon were applied to railroad locomotives, steamboats, and mills. Oliver Evans (1755-1819) of New Castle County, Delaware, learned of Watt's work when Evans was about 17 years old. The development and utilization of the steam engine became a burning desire with him, but his desire was hindered at the outset by "financial limitations" and "public ridicule."

When about 30 years of age, he began working on a "steam carriage" in the city of Philadelphia. He eventually laid this activity aside to concentrate on the stationary steam engine. By 1802 he had an engine in operation. "It was a high pressure steam engine with a cylinder six inches in diameter and a piston of 18" stroke." He began building and selling steam engines and is credited as the first man in the United States to make this his specialty. What had been considered a "folly" became accepted. By 1819 50 of his engines were in use and his patents were being infringed.[5]

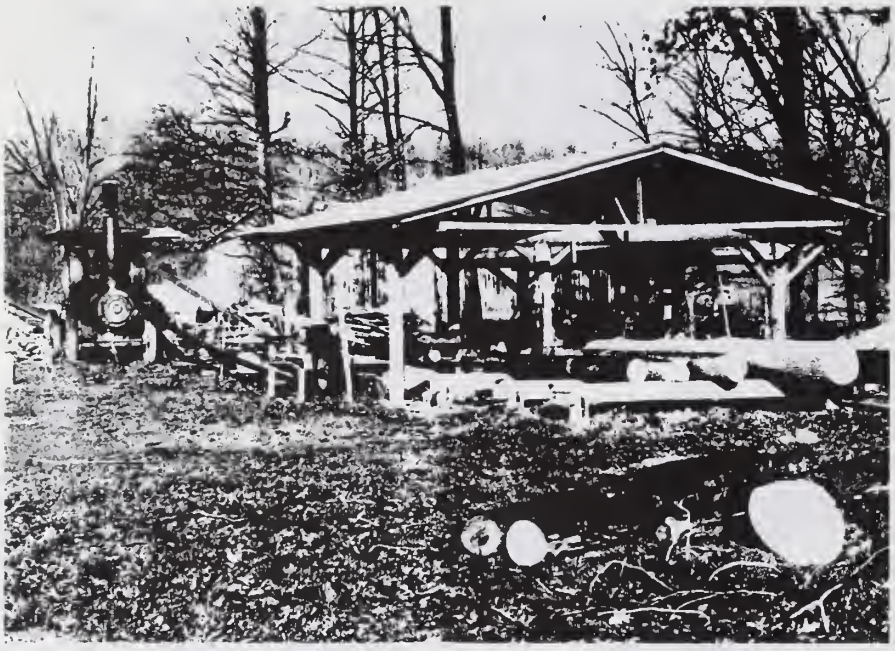
It is not known whether Evans was the first to drive a sawmill with steam. Nevertheless one of his engines may have been. A Mississippi flood in the spring of 1803 carried a steamboat equipped with an Evans engine nearly one half mile inland near New Orleans. It was impossible to get the boat back into the river so the owners sold the steam engine to William Donaldson who installed it at his sawmill. Local sawyers, like the British sawyers before them, were fearful they might be forced out of work and finally burned down the Donaldson mill on the third try.[6]

The advent of the steam engine did not lead to its immediate use. Writing on early sawmills in New Jersey, Weiss and Weiss show that steam mills were in operation in that state by 1853. "But what is amazing," they say, "is the persistence of the single up-and-down saw for the best part of 200 years, and also the continuance of water powered sawmills into the 1850s when their number was declining."[7] The gradual replacement of water as the chief source of power is confirmed by Rosenberg.



Jim Johnson's Rumely steam engine and the sawmill at the steam and gas show at Baraboo, Wisconsin, 1981.

Courtesy of Barbara De Vault, Route 2, Box 6968, Lodi, Wisconsin.



Courtesy of Glen Whaley, 220 Glendora Drive, Bloomington, Indiana 47401.

Technology is "shaped and modified in response to a very particular set of needs, goals or resource constraints." The specific uses to which steam could be put in manufacturing lumber had to be constantly evaluated in terms of the demands for lumber, the cost of operating by steam and the availability of alternative forms of power.

The American preference for water power over steam, especially in New England, was not due to a shortage of steam engines. Steam engines were available. It has been estimated that at least 250 small concerns were building them in the United States as early as 1838 and that at least 1800 stationary engines were in operation. What it came down to was that water power was abundant and cheap while steam engines were expensive, subject to breakdown, in need of constant attention when in operation, and "profligate in their utilization of fuel." As a result, a wider use of steam depended upon "the westward movement of population and industry into a geographical region which offered fewer sources of water power."[8]

The lumber industry began on a narrow strip of land running along the eastern seaboard. In 1840 Maine led the nation in the production of lumber. Bangor was the state's largest sawmill center. Ten years later New York, with Glen Falls as the sawmill capital, had surpassed Maine. By 1870 the leading producer was Michigan followed by Pennsylvania, New York and Wisconsin. In 30 years Maine had fallen to the fifth spot. At the turn of the century Wisconsin, Michigan and Minnesota, in that order, led the nation in the production of lumber. It was evident by this time that another shift was occurring as Alabama and Washington had become leading producers.

This territorial shift in the source of the nation's lumber supply, together with the increased demand for it, required that sawmills be erected in places where water power was scarce or absent. This is what made steam power economically feasible. Boiler water was necessary but in limited quantities. Fuel to fire the boilers was at hand in the slabs. At last it made sense to turn to steam!

The earliest sawmills in the lumbering areas around the Great Lakes were quite primitive by contemporary standards and, of course, were powered by water. For example the first sawmill in what is now the state of Wisconsin, was erected by Jacob Franks in 1809. It has been described as "a very small affair." Franks' sawmill was situated on land acquired from the Indians and was located on the banks of la Riviere du Diable near Green Bay. He soon built a grist mill and at least two houses on the same property. A fur trader and British sympathizer, he entered into a scheme to circumvent the efforts of the United States to prevent British traders from carrying goods into Indian country within the territory of the United States. When the war of 1812 broke out, Franks sold his property in the Green Bay area to John Lowe, his nephew, and moved to Montreal.[9]

Another of the early water powered mills in Wisconsin was the Wheeler and Morley Mill in Fond du Lac. It has been described as a "curosity." Sometimes the sawyer had to give the wheel a shove to get it going. The saw, the "ancient 'sash,' the jerking of whose heavy framework kept everything in a shake . . . the wooden carriage ran out over the pond. On this carriage, flocks of shouting children . . . were in the habit of riding, in a slow, hitching manner, out over the pond, to be 'gigged back' with a rush."[10] In 1855 a flood swept the dam and the sawmill was never rebuilt.

The first steam powered sawmill in northern Wisconsin was erected at Fond du Lac in 1846 by Col. Cornelius Davis and A. G. Ruggles. Col. Davis furnished the "experience" while Ruggles, who became president of the Fond du Lac Bank, furnished the "money." Ruggles went East to purchase the engine and machinery. "These were put on the Hudson at Cleveland . . . A terrible storm overtook the boat, and the frightened passengers for a time were determined to heave the heavy mill machinery overboard . . . Mr. Ruggles was far more thoroughly

frightened at their threats than at the storm . . . for all he had in the world was represented in the machinery." The mill, frequently called the Col. Davis Mill, was erected during the winter of 1846-47 and became operative in the spring of 1847 or 1848. The steam engine powered a sash, or frame saw, which churned up and down with "terrific jerks." Soon the sash saw was replaced with a muley saw which was declared a "great innovation." A muley saw was activated by an arrangement of crossheads. With the muley saw running day and night it was possible to saw 8000 feet of lumber in a twenty-four hour period.[11]

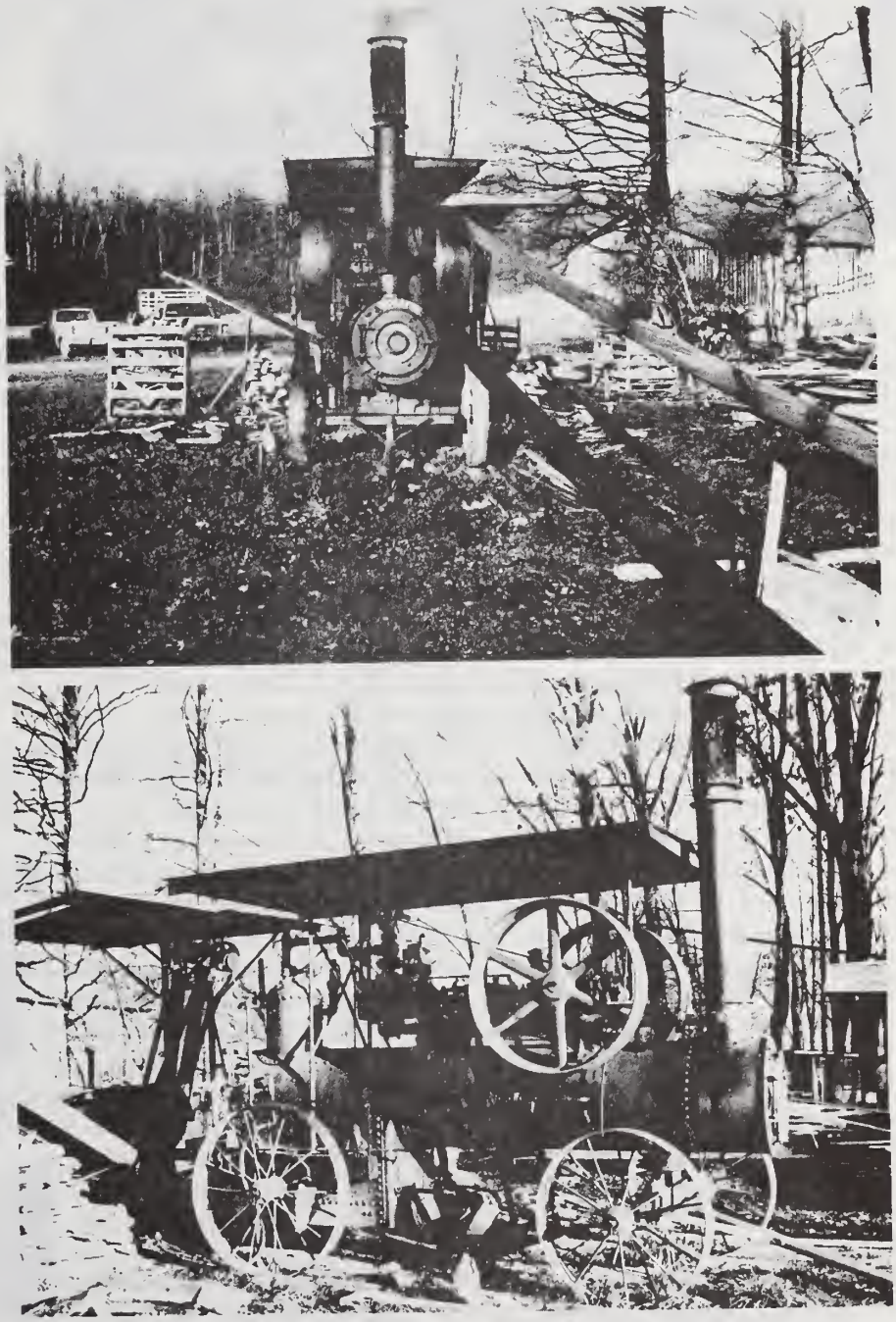
In less than ten years a sawmill at Fond du Lac installed two circular saws. This mill was eventually purchased by Alexander McDonald, whose brother John, was also in the lumber business and, at one time, manufactured threshing machinery at Fond du Lac.[12]

Larson describes two early Minnesota steam mills. In 1855 James Highland and James Wycoff of Winona equipped a mill with steam power, a muley and a circular saw. This mill could produce up to 30,000 feet of lumber a day, "a quantity heretofore unheard of in the frontier country." The next year Joel Bassett of St. Anthony Falls installed a circular sawmill powered by steam. The machinery for this mill came from Northampton, Massachusetts and was brought by team from Dubuque, Iowa.[13]

Four years later, at Rock Island, Illinois, Weyerhaeuser and Denkman purchased a steam driven sawmill. The basic units were " . . . a muley saw, which squared the logs on the downstroke, and a circular saws for cutting cants into boards. Shingles and lath were made with hand machines. Estimated capacity ranged from 6000 to 10,000 board feet per day." This mill has been described as a typical mill in the Middle West around 1860 and was the beginning of what became the famous Weyerhaeuser firm.[14]

If the introduction of steam power was important, so was that of the circular saw. These two in combination made possible the sawing of vast quantities of lumber which could be floated down river from the areas where it was produced or shipped by boat or railroad to urban areas. Fries estimates that "with the introduction of the rotary or circular saw the production of sawmills increased nearly ten percent with the same amount of power."[15]

The origin of the circular saw is obscure. Holbrook states that the circular saw was "one of the greatest single advances in the technology of making lumber." He credits Benjamin Cummings (sic) of Bentonville, New York with the first American patent.[16] He may be correct on both matters, however,



Courtesy of Glen Whaley, 220 Glendora Drive, Bloomington, Indiana 47401.

Courtesy of Glen Whaley, 220 Glendora Drive, Bloomington, Indiana 47401.

there is compelling evidence that the circular saw was probably developed in Europe. One source asserts that the circular saw was first practically used in Holland but that its development was due to English, and especially American efforts.[17]

Sir Marc Isambard Brunel (1769-1849) is often credited with the development of the circular saw. He was born in England, migrated to America and became chief engineer for the city of New York. Among other things, he invented a "writing and drawing machine," machines for winding cotton thread and knitting apparatus. "Between the years 1805 and 1812 Brunel was occupied in perfecting various machines for sawing, cutting and bending timber as well as for cutting staves." He erected sawmills for the British government and operated a mill of his own at Battersea. Eventually he went broke and served a prison sentence for failure to meet his financial obligations. When released, he devoted his later years to the construction of a tunnel under the Thames River.[18]

Usher credits Brunel with an ingenious scheme for manufacturing blocks for the British Navy. "The complete outfit of machinery embraced 44 machines . . . sawing machines, both reciprocating and circular." He continues, "Brunel devised other woodworking machines, but they were not financially successful, and the example he set by the block manufacturing was without immediate consequence in England."[19]

The first circular saws were made "flat and heavy" of number 3 or 4 gauge metal. These crude round sheets of heavy metal were hammered out on the anvil and had roughly punched out teeth. These first saws had to be run at a relatively slow speed. Otherwise they wobbled so much that the lumber produced was so crooked that it was almost useless. Obviously the circular saw was greatly improved. But as timber became scarce, its wide kerf was considered wasteful and the band saw was adopted. The band saw, also of European origin, took its place beside the circular saw, just as the circular saw had been a companion of the muley saw.

The steam powered circular sawmill was a reality by 1850. The steam engine and the circular saw were brought together when their use became economically feasible and the demand for lumber was increasing. Their combined usage was attendant upon certain related developments and associated consequences. Only a few will be mentioned here.

As seen in retrospect, one of the simplest was the drive belt by which power from the bandwheel of a steam engine could be applied directly to the main shaft of a circular saw. In 1812, Richard Trevithick, credited with the first steam engine to power a thresher, used a rope to transmit the power from the V-shaped flywheel of his engine. About this same time belts were used to transmit power from shafts which were driven by gears connected to water wheels. It was Paul Moody of Lowell, Massachusetts who has been credited with first conveying power directly from a drive shaft to a machine shaft by means of a drive belt. This was accomplished about 1828.[20]

(to be continued)

Steam Power & the Circular Saw

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PART II

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Another significant development was the wire nail. George Chandler of Maryland had secured a patent on a nail cutting and heading machine on December 12, 1796. Nails had been cut cold nearly 20 years earlier in Cumberland, Rhode Island. The first successful wire nail machine was built under the supervision of Major Thomas Norton by Adolph and Felix Brown of New York City. It was put into operation by William Hassall of the same city in 1851. To have constructed the number of buildings erected during the next five decades without the wire nail would have been difficult if not impossible.[21]

A third development of considerable importance was improved means of transportation. The railroad and steam ship were themselves users of wood products. Most ships were made of wood and railroads consumed much wood for fuel and lumber for bridges, piles, depots, cars, turntables and crossties. Many sawmills along the routes of railroads supplied the lumber and ties needed. But besides being consumers of lumber the ships and railroads made possible the transporting of lumber to centers of population at great distances.

A fourth development of consequence was the rapid rise in population. The first cencus taken in 1790 revealed that Virginia had the largest population. The grand total for the United States was four million, or slightly more than half that of the Chicago metropolitan area in 1980.

By 1850 the population had reached 23,000,000. At the end of the century it had increased threefold to 75,994,575 and passed the 100,000,000 mark within another twenty years.[22] This growth was accompanied by an increase in the urban population to the point where it exceeded the rural population. But farmers, as well as city dwellers, were voracious users of lumber. The price of lumber and the quantity used appears to have fluctuated with the prices farmers were receiving for their grain and livestock.

A fifth development was a set of consequences that flowed from the increase in population and the resultant demand for lumber and wood products, that is diversification and specialization within the lumber industry itself. The frame house could be erected more quickly if lumber were cut to specifications. There was at once a need for furniture, doors, sashes, windows, shades, wagons, caskets, carriages, and cabinets. To meet some of these diverse needs, the planing mill, veneer mill, and shingle saw, to mention only three, were devised. Joseph Bramah (1748-1814) of Yorkshire, England, apprenticed as a carpenter, employed as a cabinet maker and water closet mechanic, inventor of an improved lock, developed a planing mill.[23]

One of the earliest planing mills in Wisconsin was owned by August Graham Ruggles of Fond du Lac. His mill was built in 1852 but he apparently had difficulties with it as no one could sharpen a planer, or 'hang' the knives . . . There was business enough but no one who could be had who was expert enough.[24]

The veneer saw has been attributed to Brunel who also had a hand in the development of the circular saw. The introduction of the shingle saw

was opposed at first because it was erroneously believed that sawed shingles would not turn water as well as shingles split by hand or by a horse powered shingle mill that operated much as a guillotine.[25] Eventually two kinds of shingle mills developed. One used a saw blade set horizontally. The other used a blade set vertically. Both were powered by steam and both can be seen at steam and gas shows in the Great Lakes area.

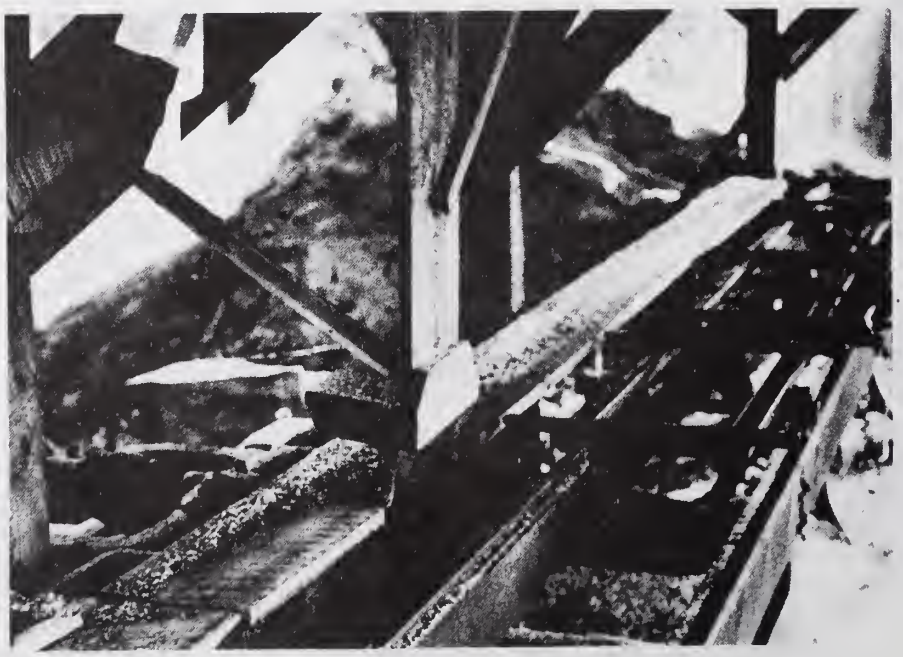
Developments begat further developments. The growth of sawmills led to the need for sawmill equipment. Consequently concerns began to spring up to fill the need. For example, Frank McDonough of Eau Claire, Wisconsin incorporated in 1889 and proceeded to manufacture steam engines, sawmills, and transmission machinery.[26] The manufacturers of steam engines for threshing saw a new use for their engines and began building sawmills.

Finally large lumber companies came into being. There were those who apparently were wiser than others, or perhaps more visionary. They saw opportunities others did not see. Or, if they saw them, they could not or did not take advantage of them. On the other hand there were a few men who believed it might be profitable to buy large tracts of timber land to assure a supply of logs for their ever-expanding sawmills. Among these was Frederick Weyerhaeuser.

Frederick Weyerhaeuser was born in Germany in 1834. Like many of his fellow countrymen he chose to come to the United States. He settled in Erie, Pennsylvania in 1852 where he worked as a brewer. Quickly he moved on to Rock Island, Illinois and sought employment at a sawmill. Fortunately his employer put him in charge of a lumber yard in Coal Valley, Illinois, and when the panic of 1857 came along, his employer became financially embarrased and Weyerhaeuser took over control of the yard. Shortly thereafter he and his brother-in-law, F.C.A. Denkman, purchased a mill where the Rock River meets the Mississippi. They paid $500 down and agreed to pay a balance of $2500. Their mill was small, cutting about 6 to 10,000 board feet per day. Within six years, however, they were free of debt and had begun to invest in timberland. Before long Weyerhaeuser acquired control of other mills, and being exceptionally far sighted, he began the purchase of forest lands as far away as Georgia (in 1882) and on the West Coast (in 1887). Weyerhaeuser also knew when to sell. As the supply of timber was depleted on his property in the Great Lakes area, he sold the land for agricultural purposes. Unfortunately the lands of northern Wisconsin, for example, were not particularly well suited to agriculture. Weyerhaeuser has been described as the outstanding lumber man of America.[27] Many of his close friends and associates became millionaires.

The Weyerhaeuser Company continues to be a leader in the lumber industry. The White River Lumber Company of Enumclaw, Washington is a part of the company's vast holdings. The two companies, Weyerhaeuser and The White River Lumber Company merged in 1949. The White River Company began operations with a sawdust fueled steam engine and sawed about 50,000 board feet per day. A Corliss steam engine was installed in 1906. By 1946 nineteen retail yards were already owned and operated by the company.[28] Today it is one of the prize possessions of the Weyerhaeuser Company.

If it were possible to become wealthy in the lumber business, it was likewise possible to be both successful and then to go broke. Charles Julius Ludwig Meyer, like Weyerhaeuser came to America from Germany in his youth. He worked briefly as a farmhand and then turned to the wagon making trade in Syracuse, New York. In 1854 he went to Chicago as a wagon maker but soon moved on to Fond du Lac, Wisconsin, where his first business seems to have been manufacturing washboards. Then he began making such articles as sashes, blinds, and doors. He expanded his plant and purchased facilities in Michigan as well. He seemed on his way to great financial success. By 1886, however, his Fond du Lac business had failed.



Courtesy of Glen Whaley, 220 Glendora Drive, Bloomington, Indiana 47401.

As in other instances, the growth of large lumber interests had its consequences. The consequences were, in this case, dual in nature. First the problem of waste and monopoly, and second, the problem of conservation. The latter had been a concern of the Teddy Roosevelt administration. The former was vividly pointed up in a report from the Department of Agriculture early in the second decade of this century. The report warned that "a concentration of a dominating control of our standing timber resources in a comparatively few enormous holdings" had occurred. It asserted that a "vast speculative purchase and holding of timberland" was common. This had resulted in an enormous increase in the value of this "diminishing natural resource with great profit to its owners."[29]

This concentration of power, plants and wealth in the hands of a relatively few large concerns was an important side, in some respects the most important side of the lumber industry. But there was another side, much smaller but more romantic. It was represented by the small operators who continued to saw chiefly for local consumption.

The number of sawmills in the United States increased dramatically in the last half of the 19th century. Generally speaking as the United States became the world's largest producer and user of lumber and wood products, two kinds of mills developed to meet the demands. Some companies built huge stationary mills that mass produced vast quantities of lumber. These were built in areas where the source of timber was nearby or could be readily shipped in, for example on the West Coast in Oregon and Washington. The second kind, the small stationary and portable mills, grew by leaps and bounds. They were established mainly in the East and Midwest where the supply of lumber was relatively limited, and tended to increase in the places where the supply of timber was decreasing such as in New York, Pennsylvania, Michigan and Wisconsin.

It is difficult to tell exactly how many custom sawmills were in operation at any given time. A big leap in lumber production occurred between 1839 and 1904. By 1900 there were more than 20,000 sawmills in the United States. By 1908 the number had doubled, but declined by 1918 to only 15,000. The Great Depression was followed by another upswing in the number of mills suggesting that custom mills tend to increase in hard times. In 1945 the Department of Agriculture reported 41,000 mills in operation. Exactly how many were portable mills is a matter of conjecture for the non-reporting mills, ". . . in general included the smaller mills, the larger mills were more apt to be known and included on cencus mailing lists."[30]

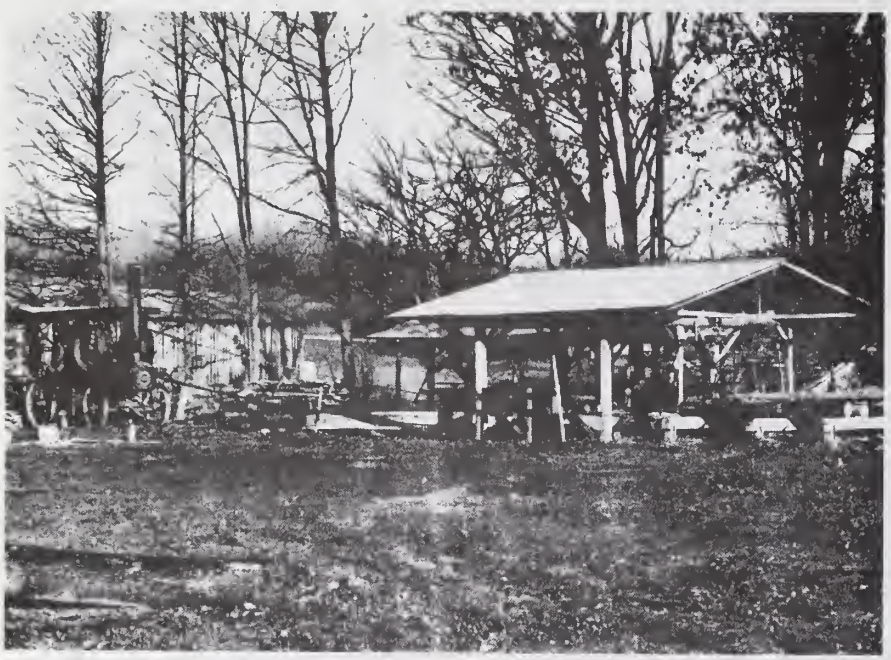
The steam engines used to power both large and small mills had been introduced into the United States at the beginning of the 19th century. The stationary steam engine had been used in the United States before steam locomotives appeared on railroads. Farm engines were installed on southern plantations about 1807 and Wik claims that 585 engines were in use in the South in 1838.[31] By 1850 engines were mounted on wheels and pulled about by oxen or horses. Well before the end of the century engines became self-propelled. J. I. Case, for example, put his self-propelled engine on the market shortly before 1880.[32]

With the portable sawmill and the portable and self-propelled steam engines it was only a matter of time before the small operator began moving his mill about in the territory now abandoned by the larger operator, or set it up in some farmer's woodlot, there to saw timber for a price. Sometimes these small operators were owners of threshing rigs who recognized the possibilities for making a little money and belted their engines to a sawmill. Already threshing machinery firms were aware of this development and had begun to make sawmills. Among the companies producing sawmills were The Robinson Company and the Gaar-Scott Company, both of Richmond, Indiana; The Geiser Manufacturing Company of Waynesboro, Pennsylvania; A. B. Farquhar of York, Pennsylvania; Keck-Gonnerman Company of Mount Vernon, Indiana; J. I. Case of Racine, and The Russell Company of Massillon, Ohio.

Some of the threshermen who operated sawmills must have made little profit and some evidently did a poor job of sawing. One would suppose this might have been true in those instances where inexperienced men ran a mill for only a few weeks each year. Nevertheless there were sawyers who ran for short periods of time and who succeeded in producing an acceptable product.

Frank E. Jefferson of Minnesota was one. In 1916 he had about 12,000 feet of logs to saw when he discovered that the mill where he planned to have them cut into lumber had raised its price from $5.50 to $6.50 per thousand. This prompted him to purchase a No. 1 American Mill with a 48" saw at the cost of $212. Heretofore he had not operated a mill, but had worked some about one in his youth.

Jefferson carefully read the instructions that came with the mill he had purchased in Minneapolis and set about his work. He recalled that "I sawed only two logs the first day and spoiled half of the first one. The next day went better and I sawed 2,000 feet of lumber and sawed it well." He employed two men to help him at a $1.00 a day and board. Besides sawing for 8 hours per day these men helped him with chores. In six 8-hour days they sawed the 12,000 feet of lumber at an estimated cost of $76.32. He figured his outlay would have been $134.00 had he taken his logs to the nearby mill. Not only did he believe that he saved money, but that he made money. Neighbors brought logs for him to saw at a fee he did not disclose.[33]



Courtesy of Glen Whaley, 220 Glendora Drive, Bloomington, Indiana 47401.

D. S. Briant of Richland, Wisconsin was another. He operated a Russell sawmill which was manufactured about 1880. He sawed 58 days during the 1919 season but usually averaged about 30 days per year, "sawing anywhere from 6 to 14,000 feet each day under capacity handling . . . "The timber consisted of maple, basswood, and elm." He operated his mill that he affectionately called "Old Russ" with the help of two men and a Case steam engine. He used a 50" saw and a drive belt of 70 feet. His mill was said to have been the oldest portable mill in Wisconsin.[34]

Over in Michigan, near Covington, a group of farmers formed the Plowman Association. They purchased a 50 horsepower Case steam engine and a large separator. Then they purchased a sawmill from R. R. Howell of Minneapolis for $1300 and set to work. They sawed from 7,000 to 8,000 feet of lumber per day using four men. They operated from early May through late June most years, but one year they sawed for nearly five months. Their timber included maple, hemlock, birch, elm, and oak. They charged $8.00 per thousand at first, but eventually increased their rates to $10.00.

In 1924 the Plowman Association decided that the steam engine was "unhandy," so they traded it in to the Case firm for a new 25 45 Case tractor valued at $2500. Such a trade was not uncommon at the time because tractors were beginning to gradually replace steam power on the farms.[35]

Sawing with steam did present problems. A supply of water was needed. Steam had to be at the proper pressure before sawing could commence. This necessitated the engineer arriving at work an hour or two early. Even though fuel had to be purchased for tractors, there was a saving realized by not burning slabs in the steam engine. These could now be cut up and sold for firewood at $2.00 to $3.00 a cord. But possibly the largest saving of all was the wages of the engineer who was no longer needed. Just crank up the tractor and let it run all day.

Still another reason why some discontinued using steam was the danger of explosions, especially with engines that were old and rusty, or were in uncertain or careless hands. For example, what was described as a "peculiar accident" killed a sawyer at Carrollton, Ohio in 1926. While sawing some "odds and ends" of a job near completion, the engine was blown nearly 200 feet away into an enbankment. The boiler "soared over a pile of slabs" and landed in a valley nearly 100 feet away. One man, standing about 15 feet from the engine was picked up and pushed head first into the frame of the sawmill and died soon thereafter.

About 18 months later, two men were killed at Viola, Illinois. The bottom of the firebox bulged up "pulling the heads off the stay bolts." Water and steam blew out the firebox door and upset a 15-barrel water tank standing behind the engine. A man on the platform was hurled against a nearby object with such force that his skull was crushed. A second man, standing between the engine and the sawmill, was thrown into the saw and mangled.

If the operation of steam engines required skill, so the sawyer needed to be wise in the setting and use of his mill. To meet the demands for information, colleges of agriculture began studying the proper care and operation of mills. Manufacturers supplied manuals and sawyers exchanged information.

Those who planned to purchase a mill were urged to buy one that had a three-block carriage, set on a "V" track, and activated by a cable feed rather than a cog driven feed. A 50" saw seems to have been preferred, and it was derirable to get one with insert teeth. In fact the purchase of 2" saw blades was considered prudent. If one had to be repaired, then the second could be used. Steam engines were thought to supply steadier power than tractors. One of 18 to 22 horsepower was about the right size.

When starting up a mill it was wise not to see how fast one could get it into operation. Owners were told to take several days during which they might walk over the grounds and think things over. A visit to a successful sawyer might suggest labor and time-saving ideas. Another injunction was to make sure the engine and the sawmill were lined up

perfectly, and then check from time to time as steam engines would shake themselves out of line. Improper alignment caused belts to run on edge which resulted in damage. Some attached a wire or rope to the governor of the engine. The rope or wire was strung to the sawmill where it was in reach of the sawyer. By the use of this arrangement the sawyer could control the speed of his saw. When sawing the engine could be run at a proper speed. When the saw was outside the log, the speed of the engine could be reduced. This was recommended as saws run out of the log at high speed tended to wobble. In case one were to set up a rig for a considerable period of time it was thought advisable to put a shed over it to protect it from the elements.

The degree of expertise needed was summed up by one man in the following fashion. The sawyer ought to know, ". . . how to file, swage, and gum a saw. If he doesn't know these, how can he tell whether they are done right or wrong? He really ought to know how to hammer a saw; he ought to know when the saw runs hot the trouble is in the track being out of line or the frame and mandrel being out of level, or whether the saw needs more lead or needs hammering.[36]

Obviously there was much more to be known about the proper operation of a sawmill than can be mentioned here. Suffice it to say that if a high grade of lumber were to be produced, the sawyer had to be quite knowledgeable.

Custom sawing by steam power is less prevalent than was the case, but there are those who still operate steam powered mills and one can see steam driven sawmills at many steam and gas shows.

The Hudson brothers, Stanley and Lloyd, of Solsberry, Indiana, have a small mill they run with the help of Glen Whaley (the engineer) and two hired men. The mill is powered with a Frick center crank portable engine with an 8½" bore and a 10" stroke. The engine was purchased a few years ago by the Hudsons who found it at Marysville, Tennessee. They use an Adkins 54" inserted tooth saw on a Corley mill. They saw "crossties, house patterns, and do custom sawing." The logs sawed are "poplar, oak, ash, walnut, cherry, hickory, sugar, sycamore, sassafras, and cedar." Whaley and the Hudsons have been friends for years. Their fathers were machinemen ". . . and you might say we grew up on a steam engine." All members of the crew are retired. "We work together because we like to and think that it is good therapy. When we get tired, we shut down and talk a while. What we don't get done today, we'll do some other time."

Besides the sawmill, the men operate a small museum consisting mainly of machinery. Included is a mill for grinding meal, several small gas engines, a Fordson tractor, and a Keck-Gonnerman 28 x 50 separator.[37]

Recently James O. Johnson of Dane, Wisconsin, belted his Advance Rumely 20 horse engine (number 14629) to his R.R. Howard and Company sawmill, manufactured at Minneapolis. He set up his rig on his farm, put his brother in charge of the engine and sawed some power poles for Bob Esser of Madison, Wisconsin. Bob is an accountant who plans to retire in a few years. The lumber from treated poles will be used as siding on a cabin he is expanding. Lumber from untreated poles will be used to panel the interior. Bob, who helped with the sawing by carrying planks from the mill to a trailer, remarked "this sure beats working." Otto Lanzendorf, a well known and much respected former thresherman and sawmill owner, said that he was "not looking for work." Pausing, he added, referring not so much to the whirr of the saw as to the bark of the Advance Rumely, "that's good music to listen to." Those who have been around custom sawmills powered by steam threshing engines certainly would agree. Their disappearance would put an end to the more romantic aspects of the lumber industry.

Courtesy of Glen Whaley, 220 Glendora Drive, Bloomington, Indiana 47401.

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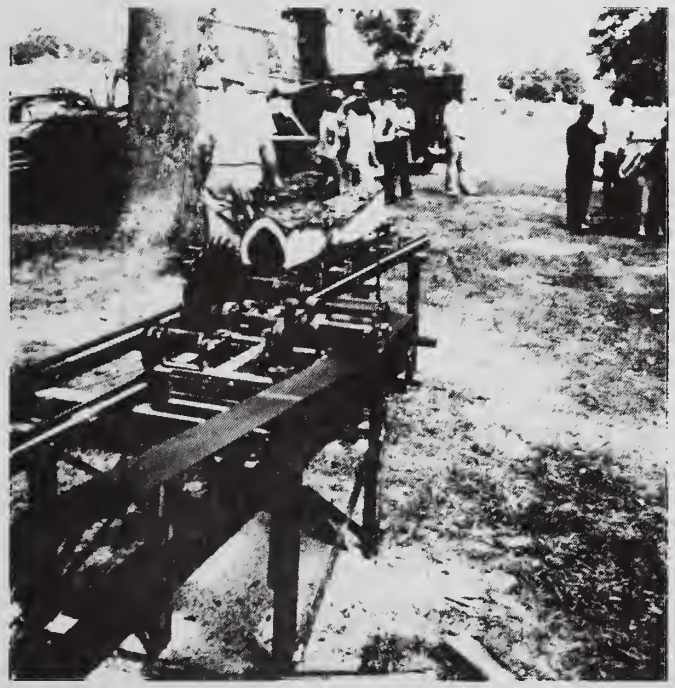
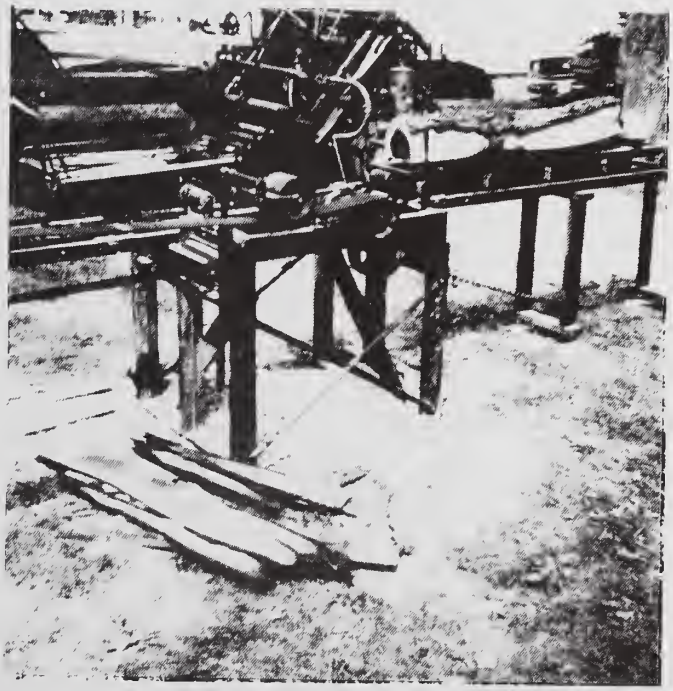
The Mobile Dimension Saw is the "new idea" in sawmilling which utilizes a new concept. The MDS travels along a track sawing dimensional lumber from the log. The vertical and horizontal blades cut a complete board from the log at one time. As the saw returns to the operator, it brings back sawed boards. The log does not move at all. The saw will cut any size lumber from 1/4" x 2" to 7-1/4" x 12-1/4". It is capable of cutting either hardwood or softwood. It can cut any size log in diameter. Additional track sections may be added to cut any length of log.





Model mill 1/3 scale by Gerald A. Fink, R R # 2, Box 228, Murphysboro, Illinois, 62966.

Reference Books

Technical Trade Information

1. Circular Sawmills and Their Efficient Operations
   Free - Write:
   United States Dept. of Agriculture Forest Service
   Suite 901, 1720 Peachtree St. N. W.
   Atlanta, Ga., 30309

2. Lumber Manufacturing, The Design and Operation of Sawmills and Plainer Mills, by E. Williston.
   See local library or write
   Bark Service Company, P. O. Box 637, Troutman, N. C. 28166 for price.

Very good reading about sawmilling

1. This was Sawmilling (1890 to 1935)
   Ralph W. Andrews (lots of pictures)

2. Trees, 1949 Yearbook of Agriculture

3. This Fascinating Lumber Business by
   Stanley F. Horn

4. John Goffe's Mill by
   George Woodburn, True story of rebuilding a mill in depression days. See local library.

5. The Loggers - Life Magazine Book

6. A Water Power Sawmill by
   Foxfire Book # 6

7. DinKies, Dams & Sawdust
   112 pages, 130 photos
   Order from Benjamin F. G. Kline, Jr.
   920 Wheaton Drive
   Lancaster, Pa., 17603